

Engineering News

Laundry Quandary-A Robotics Competition Sponsored by PUC Engineering Departments and Johnson Controls



The Departments of Engineering together with Johnson Controls hosted the Illinois Best (Boosting Engineering, Science, and Technology) Robotics Competition for the first time on November 11, 2006. Eighteen teams of high school students from Indiana and Illinois came to Purdue University Calumet to compete in designing, developing, and building a radio-controlled robot to accomplish tasks as defined by this year's theme, Laundry Quandary.

Through the generous support of Johnson Controls, this was the first time the competition was held at Purdue University Calumet. Teams assisted by a coach and mentor competed for excellence in areas of design, photogenics, durability, and most unusual. Chancellor Howard Cohen gave the keynote speech. 500+ people were in attendance making this event a huge success. Trophies were given to winning teams and, as a bonus, one scholarship was awarded to a graduating high school senior from

a winning team to attend the engineering undergraduate program at Purdue University Calumet.

Participants and visitors were also given the chance to view the engineering labs and student projects during an open house held concurrently with the event. "We are extremely pleased to host this competition," Professor C. Zhou said. "It is a great event to inspire and motivate students toward study and careers in engineering. It also provides an outstanding opportunity to promote Purdue Calumet engineering programs and attract high quality students to our university."

The BEST contest was developed to simulate a real world business and technology environment and encourage the development of skills desired by employers. For more information visit <http://www.bestinc.org>.

Good job, good future, good salary... Purdue Calumet grads find it pays to be an engineer!

This is an exciting time for engineering. There are plenty of success stories among graduates of Purdue University Calumet's undergraduate engineering program—a program steeped in Purdue tradition and recognized nationally the past three years by U.S. News & World Report. According to our survey, our students are very successful in getting multiple high paying job offers. In Fall 2006, \$59,000 was the average starting salary of baccalaureate degree graduates and \$70,000 was the highest starting salary reported. And for a graduate degree the starting salary was even higher--\$100,000 was the highest starting salary reported by Master of Science degree graduates. Purdue Calumet engineering graduates are employed at Fortune 500 companies, other industrial leaders, and government agencies such as: Arcelor Mittal USA, Advanced MicroDevices, AT&T Corporation, Argonne National Lab, BP, Boeing Company, Cisco Systems, Caterpillar, Exelon, Ford, GE, Hewlett Packard, Honeywell, Intel, Johnson Controls, John Deere, Kimberly Clark, Lockheed, Lucent Technologies, Motorola, NASA, National Semiconductor, Nextwave Systems, NIPSCO, NISource, Northrop Grumman, Panduit, Peoples Energy, Praxair, Proctor and Gamble, Sandia National Laboratories, Sargent & Lundy, Siemens, St. Margaret Hospital, Texas Instruments, United States Steel, and Westinghouse.

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Department News



Professor Houshangi with senior design students, Fall 2006, featured on the Winter/Spring 2007 issue of the Purdue Calumet magazine for Alumni



US Steel awarding the Departments of Engineering a \$10,000 grant for senior design projects



Chinese students in the "English Training in Engineering" program

From the Department Head...

Dear Engineering Friends:

Welcome to the current Engineering newsletter. We have good news from the university. We had a successful visit from AQIP which is a regional accreditation agency. Regional accreditation assures students, families, and external constituents that an institution offers a quality education.

The university is also very proud to be the recipient of a 1.7 million US Dept. of Education Title III grant. Under this grant, the university is incorporating within all undergraduate academic degree curricula structured programs of experiential learning. Types of programs include internships, cooperative education, applied research with faculty, cultural immersion (study abroad), design projects, community service learning, and practicum. Such programs will become a graduation requirement for every student enrolling at Purdue Calumet beginning in Fall 2008.

Our engineering program continues to grow and improve! In spring 2007, we enrolled approximately 400 undergraduate and 85 graduate students. The increases of the student enrollment and billing hours are around 20% and 28% respectively. We have made great strides in experiential learning opportunities for our students. Our partnerships with local industries have provided more senior design projects and internship opportunities.

Our engineering faculty continues to be productive in both teaching and research. I congratulate Prof. George Nnanna on his promotion to Associate Professor of Mechanical Engineering.

I look forward to hearing any suggestions, comments, and news from you.

Chenn Q. Zhou, Head of ME Dept. and Interim Head of ECE Dept.



Engineering Hosts AIST Committee Meeting

On February 22, 2007, the Departments of Engineering hosted a meeting tour for the Electrical Engineering Operating Committee (EEOC) and Computer Applications Operating Committee (CAOC) of Association for Iron and Steel Technology (AIST). The following presentations were made at the PUC Conference Center followed by a tour to engineering labs.

- ◆ "Overview of Steel Research Activities at PUC", Prof. Chenn Zhou
- ◆ "Computational Fluid Dynamics (CFD) Applications in Steel Industry", Prof. Chenn Zhou and students
- ◆ "Acoustical Techniques for Detection and Assessment of Damages", Prof. Yulian Kin
- ◆ "Blast Furnace Process Simulation Using Neural Network", Prof. Toma Hentea and students
- ◆ "Web Based 3-D Phase Diagram Tutorials", Prof. Harvey Abramowitz
- ◆ "Control of a Hot Blast Stove", Prof. Nasser Houshangi and students

AIST and committee members have thanked all the PUC participants for their time and effort, not only for the presentations and interesting tour, but also for their work for the steel industry as a whole.



Best Undergraduate Engineering Program Status.

New Programs

The following two new engineering programs have been created based on the needs from industry and students:

- ◆ Bachelor of Science in Electrical Engineering, Minor in Mechatronics
- ◆ Bachelor of Science in Civil Engineering, Option in structures

New Curriculum

The **Electrical and Computer Engineering** Department has created two new software engineering courses as electives for computer engineering majors. ECE 354 and 454, Software Engineering Design I and II, are for those students interested in the software side of computer engineering. These courses provide a strong educational experience. The courses are three credit hours each.

The **Mechanical Engineering** Department has divided engineering drawing (ME 114) into two labs. The existing two-credit ME 114, which was devoted to only AutoCAD, will be replaced by two one-credit lab courses. ME 115 will be devoted to engineering drawing including 2-D CAD, and ME 116 will build on that base to include 3-D parametric modeling. By splitting the course, the presentation of the material to the students will be improved.

Industrial Visits

Professor of Mechanical Engineering, Harvey Abramowitz, organized a series of field trips to different industries. During spring break, groups of students visited Indiana Harbor Coke Company in East Chicago, Indiana; Mittal IHW in East Chicago; US Steel in Gary, Indiana, to see the 84" hot strip mill; Nucor Steel in Crawfordsville, Indiana, to see electric furnace steelmaking; and the finishing operations plant at Mittal Steel in Burns Harbor. Trips are sponsored by the AIST Ferrous Metallurgy Grant Program.



JETS—TEAMS

High School Competition

On March 7, 2007, Purdue University Calumet hosted the annual JETS-TEAMS (Junior Engineering Technical Society-Tests of Engineering Aptitude, Mathematics and Science) competition for local high schools. Professor Ed Pierson from Electrical and Computer Engineering organized the event. This event receives major support from ASM Calumet Chapter. Teams from eight northwest Indiana high schools participated in the event. Competing schools were East Chicago Central, Griffith, Kouts, Lake Central, LaPorte, Munster, Rochester and Wheeler. Competition took place in the morning followed by a luncheon and awards ceremony. Teams worked on real-world engineering issues.

Science Olympiad

Purdue University Calumet hosted Indiana Science Olympiad Regional and State Tournaments this spring. Professor Constantin Apostoiaia (pictured at right) was responsible for the engineering events. Many engineering students helped these two tournaments.



Graduate School News

Engineering graduate students have increased opportunities to receive graduate assistantships on campus and internships in industry. A number of students have conducted research projects through independent studies and thesis option. Thirteen graduate students presented in the PUC Graduate Spotlight in November 2006. In our Master of Science in Engineering (MSE) program, students are allowed to take up to three independent research project courses or thesis option which is equivalent to three courses. These experiences well prepare students for their industrial career or further graduate studies. For further information, please visit <http://www.calumet.purdue.edu/engr/engrgradprogram.html>



PURDUE UNIVERSITY CALUMET

Student and Alumni News



Robert Presnack, "Alumni Committed to Excellence" 2006 Award Winner, Senior Vice President at Sargent & Lundy



Ron Hunter, "Alumni Committed to Excellence", 2006 Award Winner, CEO at Superior Engineering Corp.



Engineering Students at the First PUC Annual Graduate Student Research Conference

From Student to Professional

Alumni Profile

Bryan Robles, twice a Purdue Cal graduate, earned his bachelor's degree in engineering specialized in Mechanical Engineering in 2000 and his Master of Science in Engineering (MSE) degree in 2002. He is now an aerospace engineer working for NASA at the Marshal Space Flight Center in Huntsville, Alabama. He is currently using computer simulations to help design the Ares and Orion vehicles for our return to the moon and, possibly, a journey to Mars.



At Purdue Calumet, Brian studied computational fluid dynamics (CFD) through lectures and projects, which helped prepare him for his job at NASA. In an interview with the PUC Chancellor, Howard Cohen, published in The Times on January 28, 2007, Bryan credited what he learned in CFD classes "as playing a key role in every analysis he does as he tries to figure out how to place critical instruments in rockets so they will withstand the tremendous heat of a trip into space." He also indicated his appreciation of the accessibility of the faculty, "They showed a willingness to help people to better understand the subject at hand outside of the classroom."

Outstanding Student Awards

Every year, students are selected by their respective academic departments to be recognized as Outstanding PUC Undergraduate Students. The selection is based on outstanding performance in course work and other activities. A reception is held to honor the students in spring. A certificate is presented to each student.



This year the Engineering students chosen for this honor were Back Row (from left to right): Joshua Marlow (ME major), William Durgin (EE major), William Rutherford (ME major), Steve Naumov (CmpE major), and John Decker (ME major)

Front Row (from left to right): Andrew Umlauf (CmpE major), Daniela Dukleska (CmpE major), and Neil Osborne (EE major)

Students not pictured: Michael Wachowiak (EE major) and Nicholas Kamm (ME major)

Congratulations to all!

More Demand for Qualified Engineers.

Student Research Awards

Mechanical Engineering Students receive Undergraduate Research Awards



Andrew Arnold (top), Bin Wu, and Tom Roesel (bottom), mechanical engineering students, are the winners of PUC Undergraduate Student Research Awards for 2007. They submitted research papers and made presentations at the Student Research Day held in the Calumet Conference Center on March 23, 2007.

Bin Wu and Andrew Arnold

presented their research on "CFD Analysis on Temperature Field in a Continuous Batch Reheating Furnace". Tom Roesel's research was "3-D CFD Analysis of Bosh Erosion and Cooling in a Blast Furnace". Tom is a first-year student. Winning this award is quite an impressive feat for a freshman.



Purdue University System Student Research Competition

On April 21, 2007, PUC hosted the First Annual Purdue University System Student Research Competition. Graduate and undergraduate students from four campuses of Purdue University presented their research. The research presentations showcased some of the very best research by Purdue students in several academic fields. Four engineering students received awards:



- ♦ **Bin Wu** (left) and **Andrew Arnold**: 1st Place in Engineering and Computer Science Undergraduate Students Session for their work on "CFD Analysis of Temperature Field in a Continuous Batch Reheating Furnace,"
- ♦ **YounKyong Kim** (center): 2nd Place in Engineering and Computer Science Graduate Students Session for her work on "Exercises for Hand Rehabilitation in Haptic Virtual Environments," and
- ♦ **Naresh Selvarasu** (right): 1st Place in Engineering and Computer Science Graduate Students Session for his work on "Study of Raceway Evolution in a Blast Furnace"

Student Activities

Moonbuggy and Mini-Baja Competitions

Every year, students have exciting opportunities to join teams that design, build, and test Moonbuggy (top) and Mini-Baja (bottom) vehicles and then go on to compete nationally. The students not only gain hands-on



learning and team work experiences, but also have a lot of fun. For more information or to join the team, contact Bernard Parsons, Mechanical Lab Supervisor, at (219) 989-2668.

Society of Women Engineers (SWE) Open House

The SWE student chapter held their annual open house on March 5th. This year's event was called "Reinventing Reality". The chapter members organized this both fun and informative event.



Topics covered were 'Reinventing Yourself,' 'What's New in the Industry,' and 'Engineering your Future.' Speakers from local industries were invited. A panel was formed by four engineering alumni as pictured from left to right: Kelly Dallas from Mittal Steel, Jacqueline Flores from Motorola, Nova Carden from Naval Surface Warfare Center, and Ayiku Victoria from Caterpillar Inc. The event was sponsored by US Steel and AIST Foundation Ferrous Metallurgy Grant Program.

Information about our student organizations is available through links on our website at:

www.calumet.purdue.edu/engr/engrsocieties.html

More Career Choices for Purdue Calumet Engineering Graduates.

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Faculty News



Professor Harvey Abramowitz works with students in the Microscopy Laboratory



Professor George Nnanna with senior design students.



Professor Donald Gray with senior design students.

Productive Professors

Engineering faculty members are very active in national and international technical conferences. The following are examples of conference presentations:

K. Goplan presented “A One-dimensional Technique for embedding Data in a JPEG Color image” at the 2006 IEEE Asia Pacific Conference on Circuits and Systems in Singapore, and “A Technique for Imperceptible Embedding of Data in a Color Image” at the ICINCO 3rd International conference in 2006.

N. Houshangi presented “Establishing a Multidisciplinary Control System Laboratory” at the 2007 ASEE Annual Conference in Hawaii; and “Mobile Robot Position Determination Using Data Integration of Odometry and Gyroscope” at the 11th International Symposium on Robotics and Applications, World Automation Congress 2006, in Budapest, Hungary, July 2006.

Y. Kin presented “Assessment of Aging Structural Damage Using Acoustic Spectroscopy” at the World Congress on Ultrasonics in Vienna, Austria, April 2007; “Multidisciplinary Engineering projects (Design, Manufacturing, Research)” at the 2006 International Conference on Engineering Education conference in San Juan, Puerto Rico; and “Applications of Acoustical Techniques for Detection and Assessment of Damage in Aging Structures” at the Third International Conference on Bridge Maintenance, Safety and Management in Porto, Portugal, 2006.

G. Nnanna presented a paper co-authored with Manohar Routhu entitled “Mathematical Formulation of Transport Phenomena in Buoyancy Driven Nanofluids” at the 2006 ASME International Mechanical Engineering Congress and Exposition in Chicago

X. Yang (co-author Y.K. Kim) published “Real-Time Performance Analysis of Hand Writing Rehabilitation Exercise in Haptic Virtual Reality” at the proceedings of 20th Canadian Conference on Electrical and Computer Engineering in Vancouver, BC April 2007; and “3D Painting for Hand Movement Training in Interactive Haptic Virtual Environment” (co-authors Y.K. Kim, Q. Wu, Q. Chen) at the proceeding of the Joint 3rd International Conference SCIS & ISIS in Tokyo, Japan, September 2006.

C. Zhou co-authored several papers at the 2006 ASME International Mechanical Engineering Congress and Exposition in Chicago, Illinois, November 2006. The papers were: “A Methodology for Blast Furnace Hearth Wear Analysis”, “CFD Simulations of Flow and Pressure Distributions in Column Flow Type Fuel Cells”, “Effect of Nitrogen and Oxygen Concentration on NOx Emissions in an Aluminum Furnace” and “Heat Loss Analysis of Dross Removal in an Aluminum Furnace.” Dr. Zhou also presented two papers at the 4th International Congress on the Science and technology of Ironmaking held in Osaka, Japan in November 2006. In addition, Dr. Zhou and her team have presented a number of papers at the AIST 2007 held in Indianapolis in May 2007



Faculty Participate in Research Abroad

ECE Professors K. Gopalan (on the right) and X. Yang (on the left) joined 24 of their colleagues from both Purdue University Calumet and Purdue University West Lafayette to participate in the first joint Faculty Research Abroad Program in Taiwan this spring. The purpose of this visit was to invite research collaborations between Purdue and Taiwanese faculty. Profs. Gopalan and Yang presented their research on "Information Embedding in Images for Secure Internet Communication" and "Immersive Virtual reality Based Robot Tele-operation" respectively.



Distinguished Faculty.

Faculty Focus....Dave Kozel

Dr. David Kozel, Associate Professor of Electrical and Computer Engineering, had a very productive sabbatical leave in Spring 2007. He was awarded a U.S. Patent through the Purdue Research Foundation for "Communication System with Adaptive Noise Suppression" with James DeVault and Richard Birr (NASA Kennedy Space Center), Patent No. 7,209,567, April 24, 2007. This spring, Dave also had two papers accepted at the 2007 IEEE International Conference on Electro/ Information Technology. Since he is a registered Professional Engineer (PE) in the state of Indiana, Dave taught three out of the ten Fundamentals of Engineering (FE) Exam review sessions offered at Purdue Calumet and British Petroleum (BP) this spring and will be teaching another three sessions this fall. As part of Purdue Calumet's efforts to address global warming concerns, the main focus of Dave's sabbatical this spring was building background in the energy related areas of electric drives and power electronics. A previous recipient of the Outstanding Teacher award, Professor Kozel remains committed to excellence in teaching and will be attending a one week workshop at the University of Minnesota on teaching power electronics this summer. Prof. Kozel's recent publications include:



- D. Kozel and C. Apostoiaia "Colored Noise Reduction Using Bark Scale Spectral Subtraction, Statistics, and Multiple Time Frames" Proc. IEEE Int. Conf. Electro/Information Technology, pp. 465-470, May, 2007
- C. Apostoiaia, D. Kozel, and D. Gray "Simulation of a Wind Energy Conversion Embedded System" Proc. IEEE Int. Conf. Electro/Information Technology, pp. 164-169, May, 2007

Research and Invention

Research Centers

Engineering faculty have played key roles in several interdisciplinary research centers at Purdue Calumet. G. Nnanna, Associate Professor of Mechanical Engineering, is the interim director of the Water Institute. R. Kramer, ECE Research Professor, is the director of the Energy Center, and D. Gray, Associate Professor of Electrical Engineering, is director of the Transportation Center. Other professors active in research centers include H. Abramowitz, H. Gerber, T. Hentea, Y. Kin, D. Kozel, and C. Zhou.

Research Grants and Awards

Engineering faculty are very successful in acquiring grants and awards which not only add to the prestige of the engineering departments, but also provide many opportunities for our students to learn through research experience. The following are research projects funded in Spring 2007

- ◆ Harvey Abramowitz (ME) was awarded a grant from the Science Applications International Corp. for Logistics Impact of Lead-Free Circuits/Components.
- ◆ Professor Howard Gerber (ECE) received grants for "Electromagnetic Interference Review of an Ignition Circuit" and "MicroAssembly Technologies."
- ◆ Professor Toma Hentea (ECE) received grants for BOF Slopping Indexing System Development Phases I and II.
- ◆ Professor Yulian Kin (ME) received grants from Boart Longyear, "Comparison of Fatigue Life of Competing Pin and Box Connection Thread Designs" and from BP

Products of North America, "Application of Acoustical Techniques for Detection and Assessment of Damage in Gate Valves."

- ◆ Professor George Nnanna (ME) received grants for work for the Gary Sanitary District and "Development of Nano Particle Thermal Interface Material for Cooling and Packaging of Electronics."
- ◆ Professors George Nnanna and Don Gray are developing a sensor for water security funded by the Water Institute.
- ◆ Professor Don Gray (ECE) received a grant from Prologic for "Effects of Planning and Course of Action Tool."
- ◆ Professor Chenn Zhou (ME) received grants from the Hadady Corporation for the design and analysis of heat exchangers and from Mittal Steel for the simulation of a reheat furnace. She was awarded the 2006 PUC Outstanding Sponsored Research Award

Patents

- ◆ Professor K. Gopalan recently received a patent, titled "Steganographic method for covert audio communications," for his development of a new method for embedding a covert message within a digital audio signal.
- ◆ Professor D. Kozel received a patent titled "Communication System with Adaptive Noise Suppression. See 'Faculty Focus' for more information.

Dedicated to both Teaching and Research.

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Important Dates

Open Registration for Fall 2007

Begins August 20th

Fall 2007 Classes begin

August 27

Distance Learning Engineering Graduate Courses

Begins August 20.

Professional Engineering Exam Review Course

Begins September 8th

Contact Bill Baginski for info about the above review course at 219-989-4122 or e-mail Baginski@calumet.purdue.edu

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