newsletter

Ray W. Herrick Laboratories

Purdue University, West Lafayette, IN 47907-2031 **Spring 2006**
Volume 13, Number 1

Director's Corner

The $11m development campaign continues. Cummins has recently made a very generous gift to the Laboratories' Building Fund, and will also provide funds, matched by the Goodwin Chair Challenge, for a professorship in Mechanical Engineering. Organization of the official announcement of this gift is currently underway. Many thanks to Cummins Inc., and to our Herrick, Mechanical Engineering and Purdue alumni there for their wonderful support of the Laboratories. In addition to this gift, Cummins has and continues to be a strong supporter of research at the Laboratories.

Ray and Lila Cohen kindly hosted a lunch at their home in Valparaiso in May for Herrick alumni in the northern Indiana and Illinois and south western Michigan areas. It was such a pleasure to hear stories about the Laboratories from the alumni and their families. Bill Fontaine and the 'Student Syndicate' were, of course, mentioned. Bill in his book 'Comet Amongst the Starts', wrote 'Led by students like Joe Payne, Dick Erth, Hooshang Khosrovani and their cronies, the Syndicate…began selling coffee and donuts for 5 cents each. The profit made from the modest charges was used to support picnics, social and athletic functions,….' In the nearly 20 years that I have been at the Laboratories, the coffee, donut and snack club, in its various forms, has continued to fund such activities, which have spawned more stories and happy memories.

Mike Moaveni, another alumnus of the Laboratories and currently on our Industrial Advisory Committee, is going to host a lunch in the Detroit area at the beginning of October. Currently we are looking at the 1st or the 8th of October and will post more information on the Herrick website: *http://www.ecn.purdue.edu/Herrick* as details are confirmed.

If you would like to contribute to the Herrick Labs Building Fund, all contributions are very welcome. See *http://www.ecn.purdue.edu/Herrick/development/index.html* for more information on giving to the campaign.

The Compressor and Refrigeration Conferences were held July 17-20th, and were very successful: excellent presentations and papers, great steak barbeque (as usual). The only complaints that I heard were related to the barbeque event being too short—people wanted to visit and party a lot longer! Jim Braun and Eckhard Groll did an excellent job organizing the conferences, assisted by Lorenzo Cremaschi and Doug Adams. Our ownWerner Soedel gave one of the four plenary talks, 'How I came to love compressors', a history of the role that compressors have played in his life. A full report of the conference will be in the next newsletter. Pictured above are Eckhard Groll and Alberto Cavallini, who gave the Thursday Plenary Lecture. Pictured below are our conference secretary Ginny Freeman and her sister Mary Gear.

Eckhard Groll and Alberto Cavallini

Patricia Davies

Pictured left to right are Mary Gear and Ginny Freeman.

Energy-Saving Methods for Small Office Buildings

—Emil Venere,University News Service

Jim Braun and his graduate students, Kyoung-Ho Lee and Bo Shen, have developed a method for "precooling" small office buildings and reducing energy consumption during times of peak demand, promising not only to save money but also to help prevent power failures during hot summer days.

The method has been shown to reduce the cooling-related demand for electricity in small office buildings by 30 percent during hours of peak power consumption in California's sweltering summer climate. Small office buildings represent the majority of commercial structures, so reducing the electricity demand for air conditioning in those buildings could help California prevent power-capacity problems like those that plagued the state in 2000 and 2001.

Jim Braun, pictured above, and his students are researching more cost effective and efficient cooling technologies for small structures.

The results focus on California because the research was funded by the California Energy Commission, but the same demand-saving approach could be tailored to buildings in any state.

Findings were detailed in three papers presented on January 23 during the Winter Meeting of the American Society of Heating, Refrigerating and Air-Conditioning Engineers in Chicago. Two of the papers were written by Braun and doctoral student Kyoung-Ho Lee. The other paper was written by researchers at the Lawrence Berkeley National Laboratory, a U.S. Department of Energy laboratory managed by the University of California.

The method works by running air conditioning at cooler-than-normal settings in the morning and then raising the thermostat to warmer-than-normal settings in the afternoon, when energy consumption escalates during hot summer months. Because the building's mass has been cooled down, it does not require as much energy for air conditioning during the hottest time of day, when electricity is most expensive and in highest demand.

Precooling structures so that it takes less power to cool buildings during times of peak demand is not a new concept. But researchers have developed a "control algorithm," or software that determines the best strategy for changing thermostat settings in a given building in order to save the most money. Research has shown that using a thermal mass control strategy improperly can actually result in higher energy costs. Factors such as a building's construction, the design of its air-conditioning system, number of windows, whether the floors are carpeted, and other information must be carefully considered to determine how to best use the method.

"The idea is to set the thermostat at 70 degrees Fahrenheit for the morning hours, and then you start adjusting that temperature upwards with a maximum temperature of around 78 during the afternoon hours," Braun said. "When the thermostat settings are adjusted in an optimal fashion, the result is a 25 percent to 30 percent reduction in peak electrical demand for air conditioning.

"If you couple this reduction in demand with a utility rate structure that charges more during critical peak periods, utility costs will drop. Without such a change in peak rates, though, the actual impact on operating costs is relatively small, with about $50 in annual savings per 1,000 square feet of building space.

"A good incentive for reducing peak demand would be to impose a higher peak demand charge for the critical peak-pricing periods, and if customers reduce their consumption during these times, they are rewarded with lower energy costs for the rest of the time."

The recent work at Purdue has been geared toward small commercial buildings, which use a type of cooling system called "packaged" air conditioning equipment.

"Small commercial buildings tend to be one to four stories, but the main distinction is that they use packaged equipment," Braun said. "A packaged air conditioner is a cooling system that is completely assembled in a factory rather than on the site. An example of a small commercial building might be a shopping mall, which contains several rooftop air conditioning units that all have individual thermostat controls, compared to a system that has one central cooling system that must be put together on the site."

Researchers at the Berkeley lab performed field demonstrations and evaluated the human-comfort aspects of different thermostat adjustment strategies, specifically how cool the temperature can be reduced in the morning hours and how high it can rise in the afternoon hours before the building occupants complain.

Carbon Dioxide Promises Green Alternative for Air Conditioners and Refrigerators

—Emil Venere,University News Service

Engineers developing technologies that use environmentally friendly carbon dioxide as a refrigerant instead of conventional, synthetic global-warming and ozone-depleting chemicals met at Purdue University in mid-March to discuss the latest research.

The conference included talks about applications ranging from soft drink vending machines to portable air conditioners used by the U.S. Army for a variety of roles, such as cooling troops and electronic equipment. Talks also covered the use of carbon dioxide to run "heat pumps," which operate like air conditioners in reverse, to warm swimming pools and homes.

Although carbon dioxide is a global-warming gas, conventional refrigerants, called hydrofluorocarbons, cause about 1,400 times more global warming than the same quantity of carbon dioxide. The tiny quantities of carbon dioxide that would be released from air conditioners would be insignificant compared to the huge amounts produced from burning fossil fuels for energy and transportation, Groll said.

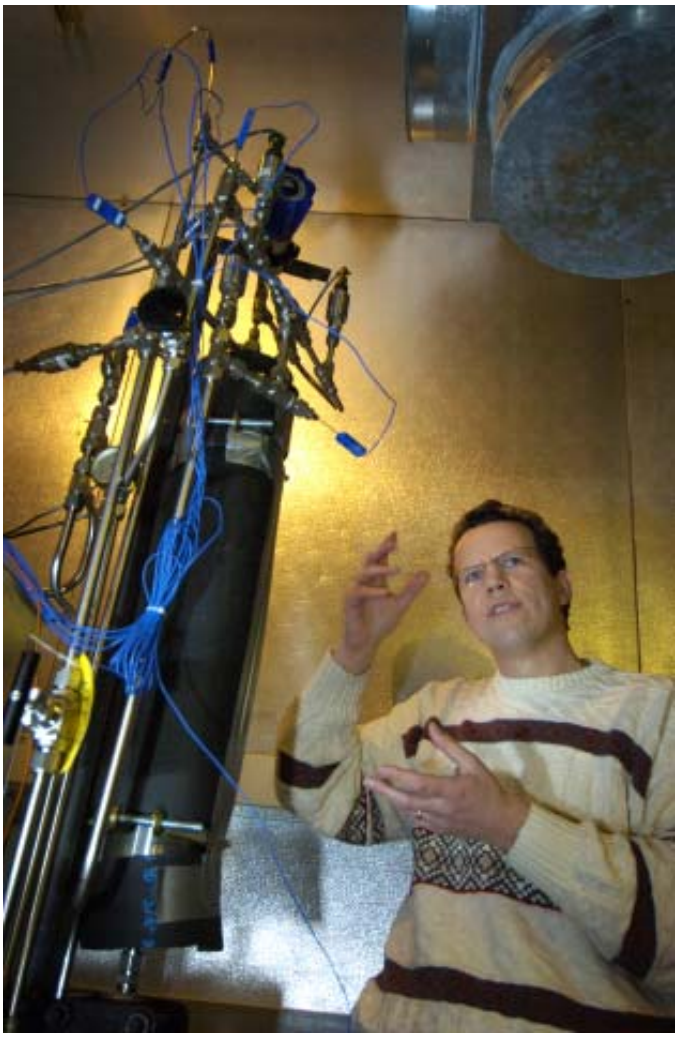
"Carbon dioxide has unique characteristics that make it an ideal green-technology alternative for certain applications in refrigeration and heating," said Groll, who is developing carbon dioxide-based air conditioning systems as part of his research.

Engineers from industry and academia will discuss their work during the annual meeting of the Carbon Dioxide Interest Group, an international organization promoting carbon dioxide as a refrigerant. The conference took place March 16-17 at the Burton D. Morgan Center for Entrepreneurship at Purdue's Discovery Park, the university's hub for interdisciplinary research.

Carbon dioxide was the refrigerant of choice during the early 20th century but was later replaced with manmade chemicals. A major drawback to carbon dioxide systems is that they must be operated at pressures up to five times higher than current systems. The need to operate at high pressure posed certain engineering challenges and required the use of heavy steel tubing.

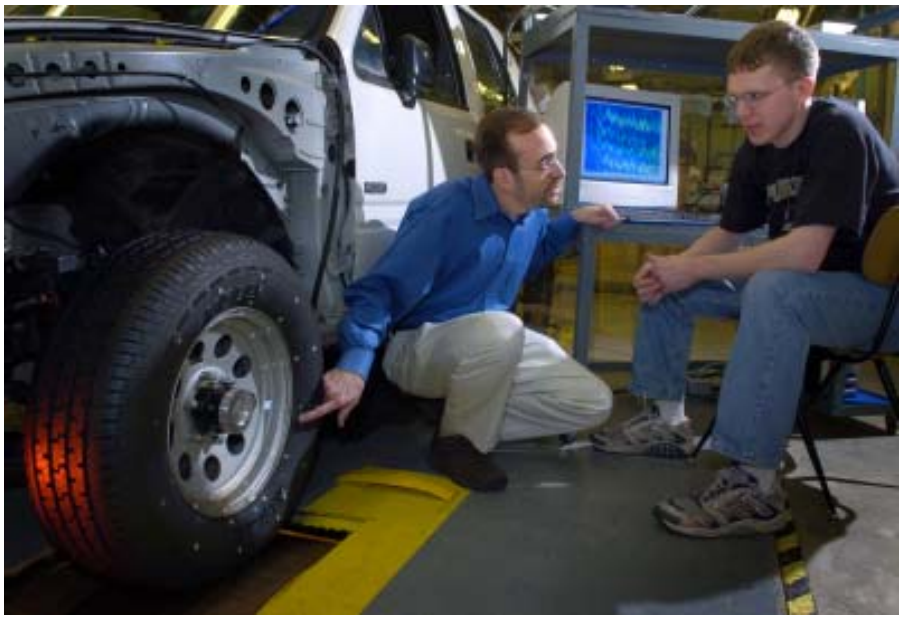
During the 1930s, carbon dioxide was replaced by synthetic refrigerants, called chlorofluorocarbons, or CFCs, which worked well in low-pressure systems. But scientists later discovered that those refrigerants were damaging the Earth's stratospheric ozone layer, which filters dangerous ultraviolet radiation. CFCs have since been replaced by hydrofluorocarbons, which are not hazardous to the ozone layer but still cause global warming.

Now carbon dioxide may be on the verge of a comeback because of technological advances that include the manufacture of extremely thin yet strong aluminum tubing, replacing the heavy steel tubing, said Groll, who is affiliated with the Energy Center at Discovery Park.



Eckhard Groll demonstrates a prototype portable air conditioning unit that uses carbon dioxide as a refrigerant instead of conventional chemicals. The prototype has been developed as part of research funded by the U.S. Army. Carbon dioxide is a green alternative to conventional refrigerants, which cause about 1,400 times more global warming than the same quantity of carbon dioxide. (Purdue News Service photo/David Umberger)

Diagnostic Method Drives Better Tire Testing for Industry



Douglas E. Adams, left, and doctoral student Timothy J. Johnson use their diagnostic system to detect tire damage as sensor data are displayed in a "wavelet map" on a computer monitor, enabling the engineers to not only detect damage but also possibly pinpoint its location on the tire. The tire-testing research uses sensors and mathematical models to detect defects in newly manufactured tires. (Purdue News Service photo/David Umberger)

—Emil Venere,University News Service

Doug Adams and Tim Johnson have developed a system that uses sensors and mathematical models to detect defects in newly manufactured tires better than conventional inspections, promising to help industry meet more stringent federal tire-durability requirements.

The diagnostic technique works by analyzing vibration waves passing through a tire to detect damage that leads to cracks in the bead area, where the tire connects to the steel rim of the wheel. A crack will sometimes form in the bead area and spread entirely around the tire, causing the tire to lose air or otherwise fail.

"The fatigue endurance testing needed to ensure that all automotive tires meet the new durability requirements is time consuming and costly," Adams said. "And because the testing is carried out by technicians conducting manual inspections, the results can vary based on a technician's skill and other factors.

"When you build a mathematical model of a tire, part of the purpose is to predict how a crack will spread once it starts," said Adams. "But another big part of the model is to determine how the crack gets started in the first place. If industry can better understand how cracks initiate, manufacturers can build a better tire."

Such models promise to help industry improve the tire-testing process. Manufacturers now randomly test new tires using rollers to create punishing forces and conditions designed to push tires to their limits and speed up the wear caused by actual driving.

"Periodically, the technicians will stop the test and manually inspect a tire by passing their hands over the tire bead area to feel for little air bubbles," Adams said.

The bubbles form when rubber in the bead area separates from underlying layers.

The Purdue researchers compared their diagnostic system's performance to a technician's manual inspection at a tire-manufacturing plant. The technician discovered bubbles in a tire after two and a half days of mechanical endurance testing, and Purdue's system detected damage in the same tire about 12 hours into the test, or one-fifth the time it took for the manual inspection.

"Detecting damage a day and a half earlier than the technician found it means this kind of system should save a lot of time and money," Adams said. "We are able to do this because we can detect damage before the bubble actually forms."

Damage to the bead area causes the tire to rotate unevenly, and data from vibration waves reveal this slight wobble. The data were displayed on a computer monitor in a "wavelet map" that enabled the engineers to not only detect damage but also possibly pinpoint its location on the tire.

"The goal is to collect data and identify when the bead area damage has initiated, and the whole purpose of doing that is so that we can build better models and know the tires are as durable as we want them to be," Adams said.

The engineers plan to extend their research to test what happens to a tire when drivers hit curbs while parallel parking. The engineers will simulate the curb-impact effects with a tower-like apparatus that drops a weight from a height of about 6 feet onto an object being tested. The research has been industry funded.

Herrick Faculty Attend NAE Meeting

Patricia Davies and Bob Bernhard are serving on a National Academy of Engineering Committee on *Technology for a Quieter America*. Shown below are Bob and Patricia in a meeting at the National Academies in Washington, DC.

Pictured from the left to right are seated Patricia Davies, Beth Cooper, Bob Bernhard and Yvonne Bennett who will be a graduate policy fellow at NAE this summer. Second Row: Ken Eldred, Bob Hellweg, Gerald Lauchle, Richard Taber, Colin Hanson and Richard Lyon; Third Row: Bob Bruce and Bill Lang.

Acoustics Workshop at Purdue

Last year, Bob Bernhard wrote a proposal to make Acoustics one of Purdue Engineering's official Signature Areas. Though aware of many activities, Bob was surprised to find out how much acoustics research is being done on the Purdue campus. While Acoustics did not become one of the official Signature Areas, the effort was very successful in bringing people together and developing great enthusiasm for potential research collaborations across the group. To capitalize on the momentum gained during the proposal preparation, Bob Novak, Head of Speech, Language and Hearing Sciences, ably assisted by faculty such as Herrick's Luc Mongeau, has started to organize activities to bring the group together. One outcome of this was a two-day workshop held at Purdue in May, which was attended by 68 people with a broad range of acoustics interests ranging from noise control and engineering acoustics to inner ear hair cell regeneration and models of how sound is processed and perceived. Invited speakers were: (1) Dr. Lawrence A. Crum, Chair, Acoustics and Electromagnetics Department, University of Washington. Professor, Bioengineering and Electrical Engineering, Physical Acoustics, Biomedical Ultrasound and Underwater Acoustics. (2) Dr. Brent Edwards, Director of the Hearing Research Center at the Starkey Laboratories in Berkeley, California, a Center whose mission is to translate psychoacoustic and signal processing research into help for the hearing impaired. (3) Dr. Steve Colburn, S.B., S.M., Ph.D., Electrical Engineering, Massachusetts Institute of Technology, Professor of Biomedical Engineering; Binaural Hearing Laboratory and Hearing Research Center. For more details of the workshop, see: *http://widget.ecn.purdue.edu/~parc.*

Research Progresses on Robotic Endoscope

Professor Katherine Peterson and graduate student Adam Andruska are currently building a device to investigate the motion and control of a snake-like robot in a constrained environment for use with medical endoscopes.

Above is the actual robot fabricated for control development with the initial CAD model shown as the insert.

Endoscopes typically consist of long slender bundles of fiber-optic cables that allow examination of the internal organs of a patient. These devices are used to diagnose common diseases such as colon cancer. Despite their frequent use, endoscopes require a great deal of skill to operate successfully. To this end, other researchers have been developing actuated endoscopes. Katherine and Adam hope to outline an algorithm which will allow for easy and intuitive control of these devices, thus reducing the time spent manipulating the instrument and allowing the physician to spend more time diagnosing and treating the patient.

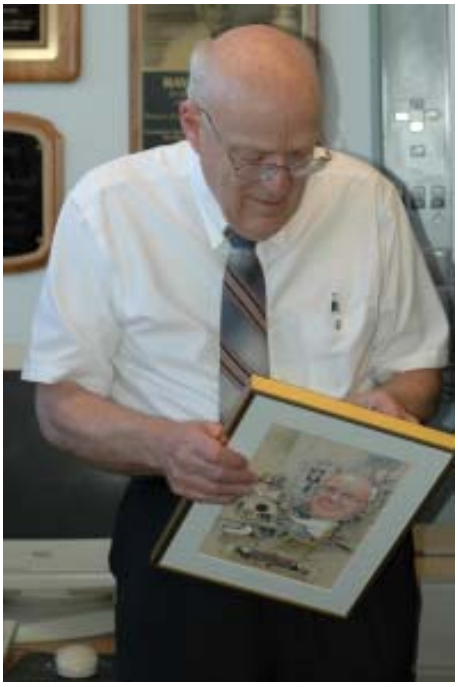
In order to develop new motion control algorithms, a test bed is being developed to investigate the motion of a snake-like robot inside a constrained environment. The test bed consists of a scale robot which mimics the unit width and curvature of an actual endoscope. The end goal is to have the robot dynamically sense its environment, then plan motion to track a reference command within the constraints imposed by the surroundings.

Once developed, this unique closed-loop control approach could be used with an actuated endoscope. Although this control research is intended for medical applications, it could also be applied to snake-like robots that perform search and rescue in building rubble, and for robotic inspection of pipe systems.

Adam Andruska and Katherine Peterson work together on controls for an endoscopic robot.

Reception Honors David Tree

David Tree's affiliation with the Ray W. Herrick Laboratories and Purdue University began in 1963 when he accepted the position of Instructor. At that time, he had his master's degree and continued the work on his doctorate in thermal sciences while he was teaching. He completed his doctorate in 1966 and was promoted to Assistant Professor. At that time, Herrick Laboratories was in its infancy, and Bill Fontaine was Director. David has been a staunch supporter of the University and the Laboratories since then. As his stature at the University grew, he was appointed Associate Professor in 1970 and Professor in 1976. He served as Assistant Head of the School of Mechanical Engineering and went on to accept the position of Assistant Director of Industrial Research Administration at the Division of Sponsord Programs on July 1, 1989.



David Tree holding his portrait. Our own Ginny Freeman is a good friend of the artist, Diane Bottom and gathered some of the photos used in the portrait.

His loyalty to the Laboratories remained steadfast. Over the years, he managed many proposals through the system to fund our research. After a long and distinguished career, mentoring 59 students to advanced degrees, he has begun partial retirement and teaches one semester a year in the Spring.

The Laboratories recognized him for his dedication and service at a reception on March 22 in the Hudelson Room of the Ray W. Herrick Laboratories. David was told he needed to attend a faculty meeting to look at photographs for the new development campaign for the renovation and expansion of the Laboratories. When he arrived, he discovered a room full of well-wishers.

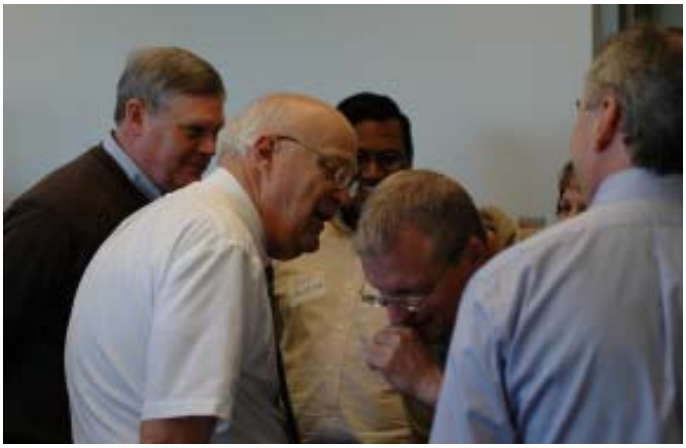
Patricia Davies served as the head of ceremonies and presented David with a book containing a collection of letters and notes from his former students, colleagues, friends,

David Tree and Patricia Davies share a joyful moment as he receives his gifts.

and family. There were also a few pictures of people from his past. He received a portrait with a personalized background that highlighed memorable moments in his career. His wife of 48 years, Roberta, was in attendance and played an integral role in organizing the guest list. Several of his long-time friends were able to attend the festivities.

Ray Cohen attended the celebration and shared his memories of their times together. Of course, no reception is complete without hearing from the guest of honor himself. David Tree thanked everyone for their attendance and reminenscensed about his time at the Labs.

One tale that has followed David over the years is the story of his brand new tie. It was the first time he'd worn it, and Avery Norfleet, then the shop supervisor, asked him, "Are you attached to that tie?" Avery took his knife out of his pocket and cut the tie. Over the years, much fun was made of the tie, David put up signs about how the tie should look and how the shop interpreted it. A cut tie was in the background in his portrait.



David Tree chats with his friends and colleagues.

International Faculty Visiting Herrick Laboratories

The Herrick Laboratories welcomed several visiting faculty members since the last newsletter. Below are brief highlights about each of them.

Tahsin Boyman has been with the Lucerne School of Engineering and Architecture in the University of Applied Sciences of Central Switzerland since 1991, and he is currently Professor of Mechanical Engineering in Thermal Systems and Head of the Laboratory for Thermal Systems. His research interests include:

- Refrigeration using natural refrigerants, mainly ammonia
- Heat transfer: Flow boiling and impact of oil on flow boiling
- Engineering education using laboratory equipment and hands-on training

Many of his projects were funded by the Swiss Federal Office of Energy for applied research in refrigeration using ammonia. He is presently involved in a European Project for Refrigerated and Frozen Food Storage using Ammonia Refrigeration.

His teaching interests include Thermodynamics, Heat Transfer, Thermal Systems (including Laboratory), and Refrigeration and Heat Pump Technology.

From 1979 to 1991 he held different positions (Research and Development Engineer, Project Manager, Head of Compressor Technology Section) with Sulzer Brothers in Winterthur , Switzerland. While there, he was involved in a team that built one of largest heat pump plants (6 units each 30MW).

Ioannis Georgiou is a tenured Associate Professor of Marine Engineering at the National Technical University (NTUA) of Athens, Greece. He is also a Consultant Scientist with Science Applications International Corporation (SAIC), Virginia. He earned a Ph.D. in Aeronautical and Astronautical Engineering from Purdue University in 1993 and an MSc and BSc in Aerospace Engineering from Texas A&M University (1986 and 1984). From 1993 to 1999 he conducted basic research in nonlinear science at the Naval Research Laboratory (NRL) as a National Academy of Sciences Research Associate and as a Research Scientist with SAIC (1996-1999). In 1999 he joined the faculty of the school of Naval Architecture and Marine Engineering at NTUA. He has a broad interest in nonlinear dynamics and mechanics of structural systems and advanced materials. He has worked on vibration and noise of coupled structures and propulsion machinery, constitutive relations and fatigue of composite materials and structures, development of data processing computational tools for computational dynamics and statics, finite element modeling of nonlinear structural systems, vibration and noise reduction of structures by means of nonlinear oscillators and nonlinear materials, stability, bifurcations, chaotic vibrations and parameter sensitivity in nonlinear structural systems. His current research interests focus on multi-scale modeling and model reduction of large scale composite structures and small scale complex structures with coupled mechanical, thermal, and electromagnetic fields, and prognostic and diagnostics for intelligent structural health monitoring with applications in naval, marine, and aerospace transportation systems.

Jie Yang researches air conditioning systems, building energy, and ventilation. Recently, she completed projects on energy consumption of digital air conditioning systems, numerical simulation on ventilation in long tunnels, building energy consumption forecast for Expo 2010 in Shanghai, hybrid ventilation simulation for high-rise commercial buildings in warm China, and similar experimental research. Her projects funded by the Chinese government and a private sponsor in China.

Jianing Zhao is currently a Professor leading a research group on building environments at the Harbin Institute of Technology in China. She has been engaged in teaching and research work in ventilation and air conditioning systems in buildings since 1982. Recently, her research has focused on the relativity of indoor air environment and outdoor air environments. She is in charge of several research projects including:

- Coupling Zonal Model with CFD for Large Enclosures with Combined Stratification Cooling and Natural Ventilation
- Study on Convective Heat Transfer of Urban Watertight Artificial Surfaces
- Design Approach of Cleaning Ventilation Systems for Industrial Melting Pot Rooms

She has authored or co-authored over 60 papers and books. Jianing has a B.S. and an M.S. both from Harbin Architecture and Civil Engineering Institute in China and a Ph.D. from Harbin Institute of Technology also in China.

Did You Know?

Peter Meckl is an accomplished vocalist and sings with one of the premier vocal groups in the Greater Lafayette Area, the Bach Chorale Singers? He was photographed by WLFI, the local television station, performing at a concert on Sunday, March 5. He also mentioned that our Director, **Patricia Davies**, used to sing with a choir in the United Kingdom.

Doug Adams and his research group were videotaped for the weekend edition of the Today Show. The featurette was aired on Saturday, March 4.

Werner Soedel celebrated his 70th birthday on March 24. Donna Cackley and the Mechanical Engineering secretaries organized a celebration in the School of Mechanical Engineering.

Where Are They Now?

Fernando Bitsie (Ph.D. 1996) is doing Structural Dynamic Finite Element Analyis in the Engineering Sciences Center at Sandia. He also volunteers as a leader for his sons' Boy Scout Troops.

Fernando Bitsie with his two sons, Neal and Bryce. Neal is a first grader and is a Tiger Cub, and Bryce is in third grade and is a Bear Cub.

Scott Kurth (MSME 1996) accepted a position with Andersen Consulting (now Accenture) when he graduated. He is currently a Researcher with Accenture Technology Labs studying the impacts of technology on businesses one to five years into the future.

James K. Thompson (Ph.D. 1979) was named a Fellow of the Society of Automotive Engineers.

Awards and Honors

Faculty

George Chiu was one of the recepients of the Team Award at the College of Engineering Faculty Excellence Awards. George received the award for his work on Digital Printing Systems along with Jan Allebach, Charles Bouman, Mark Lehto, Zygmunt Pizlo, and Yuehwern Yih. A reception and banquet was held on March 25 at the Stadium Shively Club to honor their achievement.

Patricia Davies was selected to serve on the search and advisory committee for the next John A. Edwardson Dean of Engineering. The committee includes deans, department heads, faculty, and representatives from industry.

Monika Ivantysynova and her students received the Best Paper Award of the 2005 International Workshop on Power Transmission and Motion Control. This award was given on the basis of votes of the entire audience. The workshop is one of the highest ranked scientific conferences in fluid power with limited paper contribution based on peer review.

Congratulations to all our faculty award recipients for their hard work and well-deserved awards.

Staff

Audra Brickner, who worked on raising funds for the expansion and renovation of the Ray W. Herrick Laboratories, was appointed the Director of Development for the College of Engineering at Colorado State University. Audra was with the School of Mechanical Engineering since November 2002 (and at Purdue for more than 10 years counting her time as a student). On May 1, **Alicia Pilon** joined the Development staff and filled the position vacated by Audra. Alicia is from the Boulder, Colorado area. We will miss Audra and wish her the best of luck in her new position. We also welcome Alicia.

Frankie Lee celebrated 10 years of continuous service to Purdue University on December 8. Keith Hawks, Associate Professor and Assistant Head of the School of Mechanical Enginnering, invited Fritz Peacock, Patricia Davies, and Frankie to lunch at the Sarge Oaks restaurant. Frankie received his anniversary gift at lunch, a silver wrist watch with a black band and the Purdue University griffin on the face. Anniversary gifts are given when a Purdue employee completes 10 years of continuous service and then every 5 years after that.

Fritz Peacock received a thank you letter for his support of the Defense Advanced Research Projects Agency (DARPA) autonomous vehicle project. The goal is to develop and unmanned vehicle. For more information, visit *http://news.uns.purdue.edu/html3month/2005/050929.Hirleman.darpa.html*

Representatives from the Mortar Board presented Linda Tutin with the Rose Award. Linda was speechless. Pictured left to right are Linda Tutin; Zenephia Evans, Mortar Board Advisor; Mike Muehring, and Christina Jackson.

On Monday, March 27, **Linda Tutin** was surprised when she went to the Hudelson Room to set up for an impromptu reception and, instead, received the prestigious Rose Award from the Barbara Cook Chapter of the Mortar Board. The Rose Award is given to ten clerical and service staff members across campus in the academic year. This year, there were 23 nominees. Linda was nominated by Patricia Davies and supporting documentation submitted by faculty, staff, and students who are aware of Linda's job performance and devotion to the Labs.

Linda received a dozen red roses, a certificate, and an invitation for her and a guest to attend a continental breakfast at the Mortar Board Award Ceremony in the Purdue Memorial Union Ballrooms on April 8. The Rose Award was in recognition of her years of service and dedication to the laboratories, and her willingness to go above and beyond the call of duty. Linda is talking about retiring within the next year, and the Herrick family wants her to know how much her work and dedication to the laboratories is appreciated.

Congratulations, Linda, on this well-deserved award.

Students

Daniel Robinson won one of the 2006 Joseph A. Hartman Student Paper Awards from the PARTNER Student Paper competition. He received top honors for his paper, "Thresholds for Rattle Onset: Theoretical Development and Experimental Evaluation." Daniel is working with Bob Bernhard and Luc Mongeau, and received a $4,000 cash prize for his achievement.

Daniel Robinson, winner of the Joseph A. Hartman Student Paper.

Quoting from the PARTNER Web site "Robinson's paper presents an impressive combination of theoretical and experimental results aimed at better understanding the phenomenon of rattle in windows and walls. Rattle is at the source of a significant number of noise-related complaints from people living in areas adjacent to airports." To read more about Daniel's award and his paper, visit the Web site at *http://web.mit.edu/aeroastro/www/partner/news/papercontest06.html*.

Safety at the Laboratories

In a memo to Interim Dean Leah H. Jamieson from Wayne Kjonaas, Vice President for Physical Facilities he wrote, "Radiological and Environmental Management has recommended to me that Herrick Laboratories continue to be recognized for your implementation of the Integrated Safety Program. I approve Herrick Laboratories for safety program certification renewal in recognition of your participation as a 'model' safety committee and your successful completion of safety self audits." The Herrick Laboratories' Safety Committee continues to strive for excellence where safety is concerned.

Our "Shop Guys" Fritz Peacock and Bob Brown's efforts have been instrumental in helping us achieve and maintain this certification. I am sure many of you have 'fond' memories of your own safety tests. Over the years, gradually more and more issues have to be addressed to make sure that we meet all the safety requirements. Fritz and Bob do a fine job keeping abreast of it all, always focused on the well being of the students, staff and faculty.

In Memoriam

James R. "Jim" Ramsey (MSME, 1966) passed away at 9:00 p.m. on April 17. He had been seriously ill for several years. His faculty advisor while he was at the Herrick Laboratories was J. B. Chaddock. Jim was featured in an alumnus article written by Ray Cohen in the Spring 2004 issue of the Herrick Laboratories Newsletter. The newsletter is still available on the Web at *http://www.ecn.purdue.edu/Herrick/NewsLetter/index*.

His wife, Carol, wrote in a brief e-mail, "He is in a much better place now and without pain. We are all saying how "Roscoe" [his prize-winning dog] is probably waiting for him at the pearly gates..."

If you wish to send Carol Ramsey a card or note, her address is:

2907 Holley Place
LaCrosse, WI 54601

Jim Ramsey with his beloved dog, Roscoe.

Herrick Laboratories Family News

Engagements

Jennifer Gosselin (current Masters student) and Brian Paige became engaged in April of this year and are planning a June 2, 2007 wedding.

Adam Wichman (current Masters student) and Kelly Prater (B.S. Nuclear Engineering 2006) became engaged in December and are planning a summer 2007 wedding in Indianapolis.

Weddings

Kamran Gul (current Ph.D. student) and Javaria Asif were married December 31, 2005 in Lahore, Pakistan. Javaria graduated from King Edward Medical College in Pakistan and has completed her medical licensing exam here in the U.S. She hopes to join a residency program in Internal Medicine in 2007.

Miguel Jovane (current Ph.D. student) and Catalina Ramirez were married in Inglewood, California on January 7, 2006. The couple plans to live in Panama for few years after Miguel completes his degree.

Nick Stites (current Masters student) and Emily Levi (Biomedical Engineering graduate student) were married on June 17, 2006 in Denver, Colorado.

Tengfei Zhang (current Ph.D. student) and Yang Geng were married on May 5, 2006 in China. Yang is a graduate student at Tsinghua University in China.

Zhipeng Zhong (current Ph.D. student) and Dongmei Wang were married December 12, 2005 in Shanghai, P. R. China. Dongmei is a teacher with the No. 2 Secondary School which is attached to the East China Normal University.

Births

Jason Hugenroth (Ph.D. 2006) and his wife, Tracy, and brother, Thomas, welcomed Anthony Dolph to the family. Anthony was born January 19th.

Yan Fu Kuo, (current Ph.D. student) and his wife, Chih-Fen Lin, welcomed their second child, a son, Edward, on February 15th.

Rong Deng (Ph.D. 2004) and her husband, Wenhui Ren, welcomed their second son, Kellan Yunxiang, to the family on February 18th.

Rudy Chervil (MSME 2005) and his wife, Shelia, are the proud parents of a son, Allan Sebastian, born March 14th.

Andy Osburn (Ph.D. 2003) and his wife, Kathy (Ph.D. 2005, Biology Education) announce the birth of their first child, Alexandra Grace. Alexandra was born May 3rd.

Yong-Joe Kim (Ph.D. 2003) and his wife, Min, welcomed their first child, Elia Harim, on May 9th. Both mother and daughter are doing well.

Satyam Bendapudy (Ph.D. 2004) and his wife, Kanti**,** announced the arrival of another boy, Rishabh. He was born on May 11th. Mom; Dad; big brother, Kashyap; and baby are doing fine.

Graduations

Bo Shen, Ph.D., *Improvement and Validation of Unitary Air Conditioner and Heat Pump Simulation Models at Off-Design Conditions.* Bo took a position with Trane Company in LaCrosse, Wisconsin.

Daqing Li, Ph.D., *Investigation of an Ejector-Expansion Device in a Transcritical Carbon Dioxide Cycle for Military ECU Applications.* Daqing is working with Carrier in Syracuse, New York.

Jaclynn Mohrfeld, MSME, *Systematic Feedforward Transient Fueling Identification for Internal Combustion Engines.* Jaclynn is working with Pratt-Miller Fabrication Engineering in Mooresville, North Carolina.

Jonathan White, MSME, *Impact and Thermal Damage Identification in Metallic Honeycomb Thermal Protection Systems Panels Using Active Distributed Sensing with the Method of Virtual Forces.* Jon is staying at Herrick Laboratories to pursue his Ph.D. under the direction of Professor Douglas Adams.

Matías Zañartu Salas, MSE, *Influence of Acoustic Loading on the Flow-Induced Oscillations of Single Mass Models of the Human Larynx.* Matias is pursuing a Ph.D. degree under the direction of Professor Luc Mongeau.

Uije Kim, Ph.D., *Friction-Induced Vibrations and Squeal of Glass-Run Window Sealing Systems.* Employment information not yet confirmed.

Yong Thung Cho, Ph.D., *Holographic Projection of Sound Fields Based on Spatially Limited Data Sets.* Employment information not yet confirmed.

Jason Hugenroth, Ph.D., *Liquid-Flooded Ericsson Cycle Cooler.* Employment information not yet confirmed.

Raymond Joshua, M.S.M.E., *Interfacing a Force-Feedback Joystick with Hydraulic Robot Arm*, Josh accepted a position with Toyota in Erlanger, Kentucky.

Contract and Grant Awards

(January 1, 2006-April 30, 2006)

3M General Offices, "Acoustical Characterization and Modeling of Performed Films," *J. S. Bolton*

American Concrete Pavement Association (ACPA), "Investigation of Methods to Produce Quieter PCC Pavements by Grinding and Imprinting Surface Texture," *R. J. Bernhard*

Army Research Office, "A Facility for Theoretical and Experimental Conditioning, Modeling and Prognostics of Advanced Heterogeneous Structures," *D. E. Adams*

ASHRAE/Carrier, "Willis Carrier/ASHRAE Fellowship," *J. Braun*

Comet Technology Corporation, "Fan Noise Measurement," *J. S. Bolton*

Cummins, Inc., "A Procedure for Estimation of Combustion Related Transfer Functions," *J. S. Bolton*

Cummins, Inc., "Determining the State of a Diesel Particulate Filter," *P. Meckl*

Elsevier Science, "Providing Support Services for North American Editorship of the Journal of Sound and Vibration," *J. S. Bolton and P. Davies*

Exa Corporation, "Aerodynamic Noise," *L. Mongeau*

Federal Aviation Administration, "Center for Excellence for Aircraft Noise and Aviation Emissions Mitigation," *R. J. Bernhard*

Hewlett-Packard, "Print Quality Improvement," *G. Chiu*

Lord Corporation, "Prognostics and Health Monitoring," *D. E. Adams*

Multisponsored, "CTRC-2006/Heat Transfer in Refrigerants," *E. Groll*

Multisponsored, CTRC-2006/Miniature Diaphragm Compressor," *E. Groll*

NASA, "Graduate Student Research Program, *D. E. Adams*

NASA, "Minimizing Equivalent System Mass for a Regenerative Life-Support System by Optimizing Kinetics and Energetics of Major Bio-Transformations," *G. Chiu*

Polaris Industries, "Human Response to Motorcycle Handlebar Vibration," *G. Chiu*

Sony EMCS Corporation, "Testing of a Fan Noise Control Procedure," *J. S. Bolton*

University of Cincinnati and National Institute of Health, "Phonatory Aerodynamics," *L. Mongeau*

US Army TACOM, "Development and Deployment of a Wheel End Spindle Crack Detection Methodology," *D. E. Adams*

Going Up Around Herrick

A new Biomedical Engineering building now stands behind (to the south of) Herrick Laboratories. For some of our faculty this will mean fewer cross-campus hikes to attend research meetings. For example, Stuart Bolton is working with George Wodicka and student Aaron Kyle on acoustics related to blood flow in veins and arteries, or as they would say, ultrasonic wave propagation in fluid-filled, flexible conduites with a view to developing potential diagnostic applications. Aaron recently won a best paper award at the Acoustical Society of America meeting in Providence, Rhode Island. George is Head of Biomedical Engineering; he also collaborates on acoustics projects with Luc Mongeau.

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News About You and Address Changes

We are always interested in hearing your news, and we want to be kept up-to-date on current addresses. Please send notes to Judy Hanks or to the e-mail address below. Don't hesitate to let us know of other alumns who have moved. Photos are always welcome.

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