Ray W. Herrick Laboratories

Herrick Newsletter

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Oct. 26-28, 2017 Industrial Advisory Committee Meeting

July 15, 2018 Short Courses

*Herrick Laboratories Building, 1912**
**From the J.C. Allen Collection, courtesy of Purdue University Libraries, Archives & Special Collections*

New Ray W. Herrick Laboratories Building, opened November 2013

2016 Purdue Conferences Held July 11 - 14

Dr. Eckhard Groll, Purdue Conferences Co-Chair, Dr. Didier Coulomb, Director of International Institute of Refrigeration (IIR); Dr. Timothy Wentz,, ASHRAE President; and Dr. Suresh Garimella, Purdue's Executive VP for Research and Partnerships

July 11-14, 2016 marked the 23rd International Compressor Engineering Conference, the 16th International Refrigeration & Air Conditioning Conference and the 4th International High Performance Buildings Conferences at Purdue. This year's conferences marked record attendance and papers presented. 855 people attended the conference held on the West Lafayette campus, and authors from over 40 countries submitted 688 abstracts. The team of reviewers accepted 476 papers, 444 of which were presented throughout 80 technical sessions during the four day conferences.

"This year's conferences were happening at a time when key international decisions were being considered to define the direction of issues related to the environment, climate change, and alternate refrigerants as well as introducing novel technologies," said Eckhard Groll, the Reilly Professor of Mechanical Engineering and general conference chair.

"Sessions covered areas critical to industry, commerce, and domestic air-conditioning and refrigeration. Sessions included talks on innovative design concepts aimed at reducing energy consumption and improving performance," said Jim Braun, the Herrick Professor of Engineering and chair of the Refrigeration and Air Conditioning Conference.

"Buildings require large amounts of energy for heating, cooling and ventilation, lighting and appliance services, and there is more interest lately in energy efficiency," said Braun, director of the Center for High Performance Buildings. "We also hosted an intelligent building operations workshop, and that attracted additional participants."

Buildings are responsible for roughly 40 percent of the nation's energy use, more than 70 percent of electricity consumption and more than 30 percent of carbon dioxide emissions.

Various concepts and findings, which were reported during the three conferences, have implications for energy efficiency and the environment.

2016 Purdue Conferences (continued)

This year is on track to become the hottest on record, following record years in 2014 and 2015. Meanwhile, the global use of air conditioning is expected to rise dramatically by 2030, adding around 700 million air conditioners, according to a study by the Lawrence Berkeley National Laboratory.

“The question is, where is all of the energy coming from to operate these additional systems?,” Groll said. “This expansion in air conditioning and refrigeration will drive greater needs for energy efficiency and environmental considerations.”

Groll also noted that contributing to the technical discussion each morning were the keynote speakers. Monday featured Viraj Vithoontien speaking on behalf of the World Bank’s Montreal Protocol Program. Tuesday was a presentation by Ian Beausoleil-Morrison on the use of solar energy to reduce energy needs in housing. Drusilla Hufford addressed the EPA’s SNAP program on Wednesday morning, and the week rounded out with a conference veteran, Gene Fields, presenting on the past, present & future of Scroll Compressors.

The conferences also host an array of social events, which are a great opportunity for students, industry members and academia to interact and make lifelong connections and friendships.

These social events would not be possible without the help of key sponsorships. Kawneer, Parker Hannifin, Tecumseh, and Highly each sponsored a Conference Hospitality room for a day, making this space an inviting place to meet new people and catch a cup of coffee or refreshments throughout the day. The Monday opening reception, sponsored by Carrier, was held at the Lafayette Brewing Company and was a wonderful way to kick off the conferences in a laid back atmosphere. Tuesday’s all-conference lunch, featuring keynote speaker Dr. Manpreet Singh from the Purdue Food Science Department, was sponsored by Danfoss. Dr. Singh spoke on the topic of refrigeration being a key strategy aiding global food security. Wednesday evening brought the well-received Steak BBQ and was sponsored by Emerson Climate Technologies. Six student paper award winners were also recognized during this event. Thursday’s boxed lunches, sponsored by Rheem, help to bring an end to our conference and give guests one last chance to sit and mingle with new & old acquaintances.

2016 capped one of the largest Purdue Conferences hosted by Herrick Labs, with the highest number of papers ever presented. The organizing committee is continually amazed by the support received from around the globe and uses that as motivation to make the conferences better every two years. Plans for 2018 are already underway! Mark your calendar for July 16-19, 2018, and be sure to watch the website for updates on deadlines, registration costs, and future speakers.

Viraj Vithoontien (World Bank) deliverying the keynote address on Monday

Thanos Tzempelikos, Panagiota Karava (Purdue CE professors); Ian Beausoleil-Morrison (Carleton University professor)

Manpreet Singh, one of the guest speakers after Tuesday’s lunch

Social gathering at the Trails on Wednesday evening

Industrial Advisory Committee Meeting - October 26 - 28, 2016

The 64th annual Industrial Advisry Committee (IAC) meeting was held Thursday, October 26 - Friday, October 27. Chairman, Terry Manon, welcomed everyone and started the meeting at 1:30 pm. Patricia Davies, the Labs' Director, gave the State of the Laboratories Report, which the committee commended her and the faculty for their significant and successful effort to sustain and grow the lab projects and resources. They were impressed to see the number of proposals submitted by Herrick Labs, and successfully bringing in such high quality projects. An update was given by the Strategic Planning Committee - Patricia Davies, Dave Cappelleri, Neera Jain, Jeff Rhoads, and Travis Horton. The IAC Committee is pleased to see the action being executed on the strategic plan and offered a few suggestions for further development.

Anil Bajaj, Head of Mechanical Engineering followed with an update on the School of Mechanical Engineering. The IAC Committee conveyed appreciation for Anil's leadership and will work with him in his efforts to achieve national ranking in the Top 3 for the School. Jim Braun also gave an update on the Center for High Performance Buildings meeting, which was held earlier in the week. Thursday evening's dinner was at Jane's restaurant and was enjoyed by all.

The Student Poster Show was Friday morning with 94 posters being presented. This is a great experience for the students to discuss their research and to give the Committee members a time to see all the great research projects being conducted at the Labs.

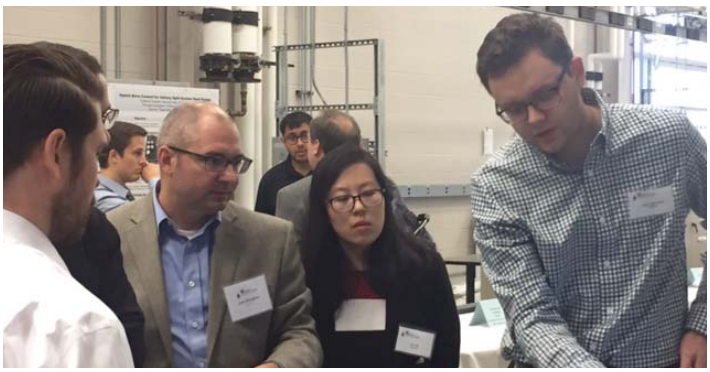
In the afternoon, there were 3 breakouts sessions covering the folloiwng topics: a) IAC-Graduate Student Mentoring, chaired by Committee members Brian Joyal and Bob Parrin and Domenique Lumpkin, Herrick student; b) Managing Growth, Diversity and Inclusion, chaired by Committee member Brad Till and Eckhard Groll, faculty; and c) Review of IAC Guidelines and Structure, chaired by Committee member Terry Manon and Jeff Rhoads, faculty.

On Saturday morning, Patricia Davies and Stuart Bolton hosted a brunch at their house before the Penn State/ Purdue football game. Even though Purdue lost, it was a fun day for all!

Below are several pictures from the IAC poster show.

Daniel McMarthur (right) discussing his Mobile Robotics research with John Nalevanko (Ford Motor Co.)

Stuart Bolton (left) and Tom Hanschen (3M)



David Halbrooks (far left), Jie Ma (center) and Andy Hjortland (right) discussing their HVAC&R research with Jon Douglas (Lennox)

Domenique Lumpkin (center) and Riley Barta (right) discussing their research project with Rob Comparin (Emerson)

Alumni Reflections - Chaitanya Bhat, MSME 2010

Chaitanya and wife Neha

In the summer of 2006, I completed my undergraduate course in Mechanical Engineering in my hometown of Bangalore, India. I had turned down a job offer at Larsen & Toubro and had not yet applied to graduate school, not knowing what specialization I wanted to pursue as a grad student. Then, I paid a visit to Indian Institute of Science (IISc), which is a stone's throw away from my home in Bangalore. There, I got in touch with Dr. Venkata Sonti, who was then an associate professor in the mechanical engineering school. As luck would have it, I learnt that Dr. Sonti had completed his PhD at Purdue University while working at Herrick Labs. He introduced me to the field of acoustics and offered me an opportunity to work on an underwater acoustics project at IISc. Soon it became clear to me that I wanted to pursue graduate studies and a career in vibro-acoustics.

I have also been a passionate student of Indian classical music since I was 8 years old, and have been training in the North Indian style of classical music, generally referred to as Hindustani classical music, which is performed either in vocal or instrumental form. I have been training in 'Khayal gayaki', which literally translates to 'singing one's imagination'. This form of music involves highly improvised elaboration of a Raaga, which is a melodic framework of specific musical notes, with different Raagas representing different emotions, time of day, seasons of the year, and so on. As the performance proceeds, the musician continues developing the Raaga with faster paced rhythmic patterns. Based on its nature, a Raaga is elaborated by means of lyrical compositions having themes such as mythology, romance, nature, valor, religion, etc. The vocalist is usually accompanied by a percussionist, who provides the rhythmic platform on which to develop the performance, and by another instrumentalist who provides melodic support by means of a reed, string or wind instrument. Pursuit of music as a passion and noise & vibration control as a profession seemed a natural fit to me.

As I continued working at IISc, I started applying to grad schools in the US, with Purdue being my most preferred destination, having heard Dr. Sonti speak about the place and its people in glowing terms. I was thrilled to have been accepted into Purdue's graduate program in spring 2008. Soon after arriving in West Lafayette, I was contacted by Dr. Peter Meckl, who gave me an opportunity to pursue my research in engine controls and combustion-induced noise in single-cylinder diesel engine at Herrick Labs. Having accepted the offer, I spent the following two and a half years at Herrick, working alongside fantastic professors such as Dr. Meckl, Dr. Stuart Bolton, Dr. Patricia Davies and Dr. John Abraham at Zucrow labs. My primary research was in combustion and combustion-induced noise radiation in a single-cylinder diesel engine controlled by means of an electronic fuel injection system. Over the course of my work, I developed a deeper understanding of engine system controls, noise and vibration measurement techniques, combustion in IC engines and digital signal processing. I learnt much from the delightfully friendly staff members and colleagues at Herrick, while sharing my work with them and learning about their projects. I enjoyed presenting my work to industry representatives during the IAC meetings, while trying to understand their views and expectations from academic research. There was always a sense of warmth and comfort about the long hours I spent at Herrick and it became my second home at Purdue. I certainly miss the Donut Thursdays in the kitchen area of the lab, and I hope the tradition continues to this day!

As much as I loved my life in Purdue, including the Midwestern winters, my desire to pursue my musical interests alongside a career in engineering made me return to India following my graduation in the summer of 2010. I accepted a job offer from Honeywell to work as a vibro-acoustics engineer in the turbocharger business. All of the knowledge I gained in Herrick has served me wonderfully well in the last six years at Honeywell, where I continue to work towards designing structurally and aerodynamically quieter turbochargers for applications across European and Asian markets. During my initial years at Honeywell, I worked mostly on diagnosing turbocharger-induced noise claims from our customers and helping manufacturing decide balancing requirements to avoid structural noise in vehicle. Since then, I have been involved in designing vibro-acoustic test rigs, defining measurement techniques, aero and structural acoustics simulations and design requirements for proactive noise and vibration control in turbochargers.

At the same time, I have become a graded artist of Indian classical music at All India Radio (AIR), with the first of my grades granted during my first semester in Purdue, which followed an audition that I did just months before I left India for West Lafayette. Since then, I have regularly done recordings or live performances at AIR. Over the years, I've been invited to perform live at various music festivals in and around Bangalore and other cities in India. I have released a couple of studio albums, which received favorable reviews by critics and connoisseurs. A YouTube search of my name yields a sample of one of the album tracks, with links to the full album for interested listeners.

In 2015, I married Neha, who is an accomplished Indian classical dancer and instructor and also a graduate in clinical psychology. We plan to collaborate in the future on projects implementing our skills in music and dance. Pursuit of music and an engineering profession, simultaneously, has certainly been challenging, especially in terms of organizing my life around two activities that demand a lot of time and dedication. However, the very nature of Indian classical music has ensured that it has always been a positive, relaxing and rejuvenating influence on other facets of my life.

I continue to live my dream of residing in my hometown, close to friends and family, while pursuing a career in vibro-acoustics and passion for music. For having helped me realize a big part of this dream, I owe much to the time I spent at Herrick, of which I have nothing but the fondest of memories. I wish to express my heartfelt gratitude to all my professors, colleagues and friends at Herrick and I wish them the very best for the future.

Below is the link to see a video about Chaitanya's musical endeavors and to hear the "Sweet Sounds of Engineering".
https://www.youtube.com/watch?v=xbh8vfCdeeAa wide a

Alumni Reflections - Sarah McGuire, PhD 2012

Sarah McGuire

I was a graduate student at Herrick for 6 years, where I worked with Dr. Patricia Davies on a project on the effects of aircraft noise on sleep in communities. As part of this project I developed a nonlinear model to predict changes in sleep structure (e.g. increase in the number of awakenings during the night and reduction in the amount of slow wave or deep sleep) caused by different nighttime air traffic scenarios such as more late night versus more early morning flights. After graduating in August 2012, I went to the University of Pennsylvania. I worked as a post-doctoral researcher for 3 years and as a research assistant professor for the past year in the Department of Psychiatry in the School of Medicine where I have been continuing my research on noise and sleep. As a graduate student I was fortunate to have the opportunity to attend several conferences and project sponsor meetings which was how I met my current mentor at UPenn, Dr. Mathias Basner.

For the past 2 years Dr. Basner and I have been conducting sleep studies in communities near airports. When I was a graduate student, I used data from sleep studies that were conducted by other researchers to develop my models. I have wanted for years to see a sleep study conducted in the U.S.; previous studies were conducted over 20 years ago and there have been significant changes in air traffic since then. I remember sitting in workshops as a graduate student discussing potential study designs and it has been exciting to see this sleep study finally come to fruition and to be a part of it. For our study, we have noise monitoring equipment setup in the participant's bedrooms. We also have the participants wear a device that measures body movement and heart rate which is used to determine whether they woke up during the night. Based on the collected data we are developing models that relate the indoor maximum noise levels of aircraft events to the probability of awakening. Each week on the project brings a new challenge from identifying ways to increase subject recruitment, to setting up equipment in different environments, to making sure the protocol is understood and being followed by each participant. Several post-baccalaureate students have worked with me on this project. Every day I try to instill a passion for research in the students working on the project with me and to keep the students motivated throughout the field work. I have often found myself repeating motivational phrases to my own students that Dr. Davies once told me when I sat in her office as a graduate student. I have learned a tremendous amount the last several years on how to be a mentor and on how to constantly adjust to situations which I feel has made me a better researcher.

When I first started graduate school with an interest in acoustics I never thought I would end up analyzing physiological signals and be a professor in a school of medicine. The skills I learned as a graduate student at Herrick have afforded me the opportunity though to explore a wide range of research areas over the last 10 years from noise effects research, to research on neurobehavioral impairments from sleep loss to changes in group cohesion in isolated environments. I am truly grateful for all the opportunities I have had and will continue to have because of the time I spent at Herrick Labs.

Sarah MdGuire (right) and 2 research assistants conducting a field sleep study at University of Pennsylvania

Rajendra Singh (Ph.D. 1975), Receives INCE Honor

Rajendra Singh

Rajendra Singh, a Herrick alumnus and faculty emeritus, Department of Mechanical and Aerospace Engineering at The Ohio State University, was honored with the Distinguished Noise Control Engineer Award on June 15 at the NoiseCon 2016 Conference in Providence, Rhode Island. Rajendra Singh is a former Herrick grad student, receiving his PhD degree in 1975 under the supervision of Prof. Werner Soedel. The topic of his thesis was: Modeling of Multicylinder Compressor Discharge Systems.

Noise-con conference is presented by INCE-USA, a member society of the International Institute of Noise Control Engineering, a consortium of organizations with interests in acoustics and noise control. To learn more about the award:
http://www.inceusa.org/about/awards/dnce

Dr. Singh was recognized for his long career as an outstanding researcher in the area of gear noise, as an exemplary educator in the noise control industry, and for extensive contributions to INCE-USA and I-INCE that have enhanced professional discussions and connections within the industry. Jeff Fullerton, vice president of Honors and Awards for INCE-USA, noted, “Dr. Singh joins a very impressive group, all of whom have shaped and advanced noise control as a benefit to society and as a profession.” His nominators lauded his “pioneering work on the vibro-acoustic and nonlinear analyses of machine elements,” and would rank Singh among the top international leaders in these fields. They cited Singh as “a source of intellectual stimulation and scholarly excitement to bright and motivated students,” and acknowledged his effective leadership in the noise control profession.

Dr. Singh’s research interests include machine dynamics, acoustics and vibrations, non-linear dynamics and signal processing, automotive noise, vibration and harshness (NVH) control, and geared system dynamics and acoustics. He is director of the National Science Foundation (NSF) Industry/University Cooperative Research Center Program’s (I/UCRC) Smart Vehicle Concepts Center at Ohio State, launched in 2007. Singh is senior fellow, Center for Automotive Research (CAR), and the first holder of a distinguished chair at Ohio State, the Donald D. Glower Chair in Engineering. He has also directed over 18 million dollars in sponsored research and grant programs over two decades.

Raj has published more than 450 papers including 230 journal articles, nine books and one patent, and has supervised 44 PhD students, 74 master’s students and 48 bachelor’s degree students. Singh developed an innovative graduate sequence on noise and vibration control in partnership with General Motors, introduced new courses in acoustics, machine dynamics and digital signal processing and developed a comprehensive and unique undergraduate honors program in mechanical engineering.

He has served on numerous professional society and editorial boards, including as past president of INCE-USA. Singh is the recipient of numerous honors and awards and was elected to the inaugural class of Ohio State’s Emeritus Academy in 2014. He has consulted with more than 50 organizations throughout his career including General Motors, Ford Motor Company, Renault, Nissan, Honda, Harley-Davidson, Cummins, Apple, Microsoft, Dow Chemical and Eaton, among many others.

Letters supporting Singh’s nomination from industry, academia, INCE-USA and I-INCE included a letter from Courtney Burroughs, INCE-USA, who stated, “He is an amazing contributor to research, teaching and service.” Teik C. Lim, dean, College of Engineering and Applied Science, University of Cincinnati commented, “Professor Singh is a prolific scholar, researcher and innovator of forward-thinking solutions…with major accomplishments that would not have happened if not for his lasting contributions in the field of noise control and acoustics and the respect he commands from his peers.”

Congratulations, Raj on this prestigious honor!

About INCE-USA
INCE-USA is a non-profit, membership-driven professional organization incorporated in Washington, D.C. and is a Member Society of the International Institute of Noise Control Engineering, a consortium of organizations with interests in acoustics and noise control. Its primary purpose is to promote noise control solutions to environmental, product, machinery, industrial and other noise problems.
http://www.inceusa.org

An early picture of Raj Singh (left) working with Professor Werner Soedel

Rajendra Singh (continued)

Helping Hearing-Impaired Children in India
More recently, Raj and his wife Veena founded a charity Give2Kidz to assist the poorest children in India.

Veena and Raj Singh (of Dublin, Ohio) founded the charity Give2Kidz to assist the poorest children in India that are hearing-impaired. The Give2Kidz earned its tax-exempt 501 (c) (3) status in August 2014 during Professor Raj Singh's first 60 days after retiring as a Professor from The Ohio State University. Professor Raj Singh is a Herrick Labs alumnus, who graduated from Purdue University in 1975.

Disabled children in India are especially at risk of being marginalized by society given the country's weak social welfare system. Give2Kidz partners with successful dedicated hearing-impaired schools in India (such as Lions Charitable Trust "Prayas" School in Bhillai) to highlight successful programs and increase awareness.

As charitable donations are received, therapists are then enabled to assist children in expanding their communication skills with other classmates, family, and friends, to reach their full potential. Give2Kidz donated funds resulted in the hiring of 3 therapists who worked with 13 children ranging from the ages of 18-months to 9-years old and will hopefully enable them to one day attend a normal school. The Singh's want to one day provide a broader range of programs to more schools and expand the scope to include occupational therapy, speech pathology, teacher training and other educational services.

Veena is planning to trek to Mount Everest Base Camp in October 2017 to highlight this cause and to raise funds. Give2Kidz always welcomes support and advocacy to families of hearing-impaired children. Donations are accepted on Paypal at GivetoKidz.org or CrowdRise, at https://www.crowdrise.com/give2kidzinc. Your donation will be impactful and will greatly help families where little help exists today. If you have any questions, please feel free to contact Veena or Raj at this address: singh.3@osu.edu.

Thank you for your consideration and Boiler Up!

Clerical and Service Staff Advisory Committee (CSSAC) - by Cindy Cory

Cindy Cory, the Herrick Labs' secretary, is currently a representiave on Purdue's CSSAC Committee. CSSAC was establlished in 1965 to serve as a means of representative participation for the clerical and service staffs at Purdue University. CSSAC is divided into four districts: **District I** may have up to 10 representatives from the Academic schools and divisions reporting to the Provost and the Director of Intercollegiate Athletics; **District II** may have up to 2 representatives from the Office of the Board of Trustees, President, Treasurer and Chief Financial Officer, Vice President for Information Technology, Vice Presdident for Public Affairs and Vice President for Ethics and Compliance; **District III** may have up to 4 representatives from all the departments reportng to the Vice President for Physcial Facilities; and **District IV** may have up to 4 representatives from Purdue Dining & Catering and University Residences/ Residential Life (formerly known as Housing and Food Services).

CSSAC awards hundreds of dollars in grants to employees and their dependents each year who are seeking higher education at Purdue. CSSAC also works hard to plan various outings for employees to enjoy, and this committee also created the employee discount program. Be sure to check out CSSAC's website at www.purdue.edu/cssac for more information on any of the above mentioned topics.

Prof. David R. Tree - July 18, 1936 - September 29, 2016

Dr. David R. Tree

David Rees Tree passed away in West Jordan, Utah on September 29, 2016. He was 80 years old.

He was born to Ira Tree and Mae (Rees) Winters on July 18, 1936 in Wanship Utah. David was just 8 years old when his father died in WWII. He is the youngest of 4 children.

He spent some of his childhood living on his Grandpa Tree's ranch where he learned to work hard. He milked cows and took care of farm animals and learned to garden. One of his great-granddaughters says, "Grandpa can 'whistle' really loud" I think he learned that on the ranch.

As a teenager he moved to Lindon and went on to Pleasant Grove High School where he met Roberta Johnson. They were engaged to be married before David left on his mission. David fulfilled a mission for the Church of Jesus Christ of Latter Day Saints to the North Central States Mission. He taught and saw only two people baptized. One was a 9 year old boy. That boy with the help of many faithful priesthood leaders, stayed faithful to the church and later became the Mission president to David's Grandson Ben.

After his mission he married Roberta in the Salt Lake City Temple on October 31, 1958. David graduated from Brigham Young University with a BS and MS in Mechanical Engineering. He then attended Purdue University where he earned a Ph.D. He remained in West Lafayette where he taught Mechanical Engineering at Purdue for over 45 years. He also spent many years at Herrick Lab working with many graduate students on research projects.

In 1970, David was given the opportunity to take a sabbatical leave from Purdue. David, Roberta and 5 young children moved to Southampton, England. David earned a post doctorate at the University. He served at church as a counselor in the district presidency while living there. While in England the family traveled all over seeing the sights. The last few weeks of the sabbatical they traveled all across Europe in a little camper trailer being pulled by their car.

David was a faithful member of The Church of Jesus Christ of Latter Day Saints. He served in numerous church assignment right up until his death. He served in Cub Scouts, Young Men's, Elders' and High Priests. He was Bishop of the Purdue Ward twice. He served 8 years as a Counselor in the Stake Presidency of the Indianapolis North Stake and multiple times on the high Council.

David and Roberta were Temple workers. First at the Chicago Temple and then once they retired they served in the Oquirrh Mountain Temple.

David loved BYU! He watched them on TV at home and would often talk about his days there and want to hear about the goings on of the Grandchildren and his son on the campus. On the last weekend of his life he wanted to hear about the BYU football game.

David always had a garden. He would come home from teaching at the University and put on old clothes and head out to the garden to hoe a row or plant a little of this or that. Many a day he roused his children from bed by singing, "Rise, and Shout!". He could also fix things. He would take broken things apart and then put them back together and get them to work. He always had a project going.

David and Roberta purchased a pop up travel trailer and the family went camping a lot. He took them all across the country and around to all of the Church Historic sights. The family spent a terrible night in the trailer in Oklahoma once, only to find out the next morning a tornado had swept through.

After retiring they sold their home in Indiana and moved to West Jordan, Utah to be close to family. David and Roberta have fond memories and dear friend that they deeply miss in Indiana.

David's true love in life was the gospel of Jesus Christ and his Family. It gave him great pride and comfort to know that his children, grandchildren and great-grandchildren were faithful members of the church.

David was preceded in in death by his father, mother and sister Noreen (Keith) Turnbow. He left behind his wife Roberta; sons, Alan (Rae) Tree, Dale (Karen) Tree; daughters, Robbi (Mark) Pixton, Becky (Mike) Pickard, Jane (Aaron) Walton; 21 Grandchildren; 18 Great-Grandchildren; sister, Stella (Stan) Welsh; brother, Ira (Janice) Tree.

Note from Patricia Davies, Director

David Tree was such a good person. I always appreciated his kindness and support when I came to Purdue as a young faculty member. He gave time and resources to people at the labs generously and was the embodiment of the Herrick spirit. He was also a great souce for news on what was going on. He also helped organize the International Compressor and Refrigeration conferences while he was at Herrick.

Prof. David R. Tree (continued)

Dave had an interesting relationship with Avery Norfleet in the shop. I recall one story of when Avery took a pair of scissors and cut off Dave's tie! When Dave left Herrick and went to work at the Sponsored Programs office, he continued to help us with our industrial contacts. I remember his retirement party at Herrick, when it seemed that everyone who had ever worked with Dave at Purdue turned up to wish him well. This was a testament to the affection that people had for Dave after having worked with him. Dave will always be remembered by those who worked with him as a very special person.

Early pictures of Dave working in the labs

Silas Avery Norfleet - July 26, 1922- August 2, 2016

Avery Norfleet

Avery Norleet, 94, passed away on August 2, 2016. He was born in Faubush, Pulaski County, Kentucky to Flora Mae McBeth and James Curry Norfleet on July 26, 1922. He married Edna Daws on May 30, 1941. He briefly moved to Cincinnati in his twenties before settling in the Lafayette area in the 1950s. On August 26, 1956, he married Alice Marie Clapp.

Avery, a passionate Boilermaker fan, was a supervisor at Purdue's Herrick Laboratories from 1967-1988. He was a gifted woodworker and had an uncanny ability to repair anything. He was often found in his workshop tinkering away on an array of projects or tending to his garden. He also enjoyed going out to breakfast and playing cards.

He leaves behind his loving wife Alice, sister, Mildred Buchanan, of Lafayette; son, Thomas Norfleet (Nancie), daughter Gearlene Simmons (Jim); 2 step-daughters Karen Nichols and Phyllis Kasowski (Andrew); 6 grandchildren, 5 great grandchildren and countless close friends. He is preceded in death by his parents and 6 siblings (Arnold, Willard, Geneva, Cecile, Herbert, and Wilbur). A graveside ceremony was held on Monday, August 8, 2016, at Montmorenci Cemetery at 10 am. As some of you may remember, Avery was Herrick Labs' technical services supervisor from 1967-1988. Even after retirement, he visited the labs frequently to say hello. He was quite a character! He always had a smile on his face and we all enjoyed hearing his stories from his former days working here.

Ray Cohen, fomer Director of Herrick Labs, stated "Avery was as good as or better at his job than anyone who I had seen in similar situations at Purdue. I would like to be able to award him additional special recognition for his contributions to the success of the Laboratories, but of course I have been away for too long to do so. There are many graduate students who owe him thanks for the assistance he gave them. Avery never had a problem in the Laboratories that he could not solve."

Patricia Davies told the story that she and Stuart Bolton were cycling through Montmorenci one day (many years ago) and saw a grave stone with Avery's name on it (no dates). They were shocked. Avery had not long retired from the Herrick Labs at that point!

Avery lived next to the grave yard in Montmorenci and so they stopped by to see if he had died and somehow they had not heard of this momentous event. Avery was alive and well. Apparently he had gotten a deal on a headstone and although he was alive and well, he had it carved without the end date and put in place for the day when it would be needed (at which time the end date could be added!).

Silas Avery Norfleet (continued)

Early picure of Avery working in the shop

Early picure of Avery (left) with Pat Brandyberry

Avery at the labs in 1977

Sadly the day has come. Our thoughts of him endure, and I am sure the family have a whole load of other stories about Avery illustrating his unique sense of humor.

Fritz Peacock, another former Technical Services Supervisor, wrote “Avery Norfleet was the kind of person who enjoyed helping other people, his some times gruff persona was usually softened by his sense of humour. He was a kind and generous man. When Director Fontaine was alive and Avery had retired from the Lab, he would drive Professor Fontaine on various errands and visits. This often included a stop for some liquid refreshment for Professor Fontaine and he. There are too many stories that should not be shared here.

Avery was an accomplished mechanist, carpenter and gardener. In his retirement years he crafted puzzles, magic tricks, and novelties from wood. He sold some of these but I suspect he gave many more away to his friends. Most memorable of his original designs was the ”loving pigs” rocker. He kept active in his shop and garden, visiting the Lab on regular basis until just a year or so ago.

I know he will be remembered fondly by the many students he helped during his tenure at the Lab. Avery was far more than just a amiable “Good-Old-Boy”; he was an intelligent and people-loving person. I am proud to say he was one of my friends.”

A Note from Patricia Davies, Director

When I read Avery’s obituary, I was surprized how soon he had retired after I started at Herrick Labs. Avery was a regular visitor to the labs after his retirement and it is only very recently that he stopped coming. He always called me “old woman” with that cheeky smile on his face, and stopped by to chat about things. It was like a ray of sunshine had come into the office. He was a good friend of Pat Brandyberry’s and we found the picture of them in our archives. He gave Pat the “Interesting” bell that she had in her office that raised eyebrows when people visited her. (Pat was the accounts person at Herrick, and still lives in Lafayette.)

Our condolences go out to Avery’s family. We will miss him.

People News

Faculty Honors & News

Peter Meckl

Peter Meckl, Assistant Head and Professor of Mechanical Engineering, received the Undergraduate Advising Award from the College of Engineering on April 8, 2016 for his steadfast commitment as lead faculty advisor to the EcoCAR2 Student Vehicle Competition team. The EcoCAR2 competition provided hands-on, real-world engineering experience through successful design, fabrication and demonstration of advanced automotive technologies. The Purdue EcoCAR2 team, calling themselves the Purdue EcoMakers, managed to place 4th in the final competition out of 15 North American teams. His nomination for the Advising Award was prepared by Professor Greg Shaver.

Patricia Davies

Patricia Davies, Professor and Director of Herrick Laboratories, received an ASME Award - the 2016 Per Bruel Gold Medal for Noise Control and Acoustics. Patricia was recognized "for exceptional leadership and educational mentorship in the field of noise control and acoustics; and for outstanding contributions to noise control engineering in the areas of signal processing, nonlinear dynamic modeling, product sound quality, and human response to noise and vibration." Formal presentation of the award took place at the President's Luncheon, November 14, 2016 during the ASME Mechanical Engineering Congress & Exposition, November 11-17, 2016, at the Phoenix Convention Center.

The Per Bruel Gold Medal for Noise Control and Acoustics was established in honor of Dr. Per Bruel who pioneered the development of highly sophisticated noise and vibration measuring and processing equipment. The medal recognizes eminent achievement and extraordinary merit in the field of noise control and acoustics, including useful applications of the principles of noise control and acoustics to the art and science of mechanical engineering.

George Chiu

George Chiu has just been approved for a 3 year appointment as the Editor-in-Chief of the IEEE/ASME Transactions on Mechatronics. Published jointly by the IEEE and ASME. This journal encompasses all practical aspects of the theory and methods of mechatronics, the synergetic integration of mechanical engineering with electronic and intelligent computer control in the design and manufacture of industrial products and processes. The ten technical areas included are: Modeling and Design, Manufacturing, Motion Control, System Integration, Vibration and Noise Control, Actuators and Sensors, Micro Devices and Opto-Electronics Systems, Intelligent Control, Automotive Systems, Robotics, and Other Applications. For more information on IEEE/ASME Transactions on Mechatronics, click on link below.

http://ieeexplore.ieee.org/xpl/aboutJournal.jsp?punumber=3516

David Cappelleri quoted as drone expert:

David Cappelleri was featured on an Indianapolis television station in June as an expert in micro aerial vehicles (also called drones). Police had recently used a drone to locate a missing Lafayette teacher. David works on UAVs at the Herrick Laboratories. His website ishttp://multiscalerobotics.org.

Professor Dave Cappelleri (left) with student Daniel McArthur

flying MAV view from the control room

People News (continued)

Speed Dating for Industry Research: Cummins and Purdue:

Cummins, Inc. and Purdue University have been industry partners for many years. At a recent networking event hosted by Professor **Greg Shaver**, Cummins visitors and a group of Purdue faculty shared a lunchtime "speed dating" session. For those not familiar with speed dating, a Cummins and a Purdue person paired up for 5 minutes to learn about each other's work, then Greg would indicate it is time to change partners, and the next 5 minute session would start. New professors got to meet a lot of Cummins people in a short amount of time. More connections between industry, researchers, and students, translates to more opportunities to move the world forward.

To view the video of this networking event, visit the site: https://www.youtube.com/watch?v=Gf7Iyip4jro

Picture from the "speed dating" networking session recently held at Herrick

Three New Engines Research Grants:

Greg Shaver

1. SuperTruck2: http://social.cummins.com/cummins-partner-peterbilt-supertruck-ii/. During the next two years Greg Shaver's team will be developing vehicle models to predict the fuel efficiency improvements of technologies developed by the team, which includes Cummins, Peterbilt, Great Dane, Exa Corporation, Meritor, Oak Ridge National Lab, and NREL.

2. US/China Clean Energy Research Center (CERC): http://www.us-china-cerc.org/trucks.html. Over the 5 year project, Greg Shaver's team will be developing control algorithms for a next generation medium-duty gasoline engine to be incorporated in an extended range electric vehicle (EREV) in collaboration with Cummins

3. ARPA-E NEXTCAR: https://arpa-e.energy.gov/?q=news-item/department-energy-announces-10-new-projects-improve-connected-and-automated-vehicle Purdue is leading this 3 year project, funded at $5M by ARPA-E. The focus is the development and real-world demonstration of vehicle connectivity-enabled controls systems. Fuel savings of up to nearly 20% are anticipated when these control strategies are combined over drivecyces incorporating real-world road grade changes, traffic, and system-to-system variation. Other Purdue faculty include Neera Jain (ME), Dan DeLaurentis (AAE) and Shaoshuai Mou (AAE).

Marehalli Prasad, Ph.D. 1980, Receives OEA Award

Dr. Marehalli Prasad (left) accepting his OEA award

Dr. Marehalli G. Prasad, Ph.D. 1980, received the Outstanding Educator Award by the Institute of Noise Control Engineering (USA). The award was given to Dr. Prasad for significantly advancing the technology and practice of noise control engineering through unique contribution to the education of future noise control engineering. The award was given at special awards session during the International Conference on Noise Control Engineering in San Francisco on August 12, 2015.

Also in December 2014, Dr. Prasad was elected a Fellow of the Institute of Noise Control Engineering (INCE) for his contributions to the advancement of Noise Control Engineering and service to the INCE. Dr. Prasad is also a Fellow of the American Society of Mechanical Engineers, the Acoustical Society of America and the Acoustical Society of India.

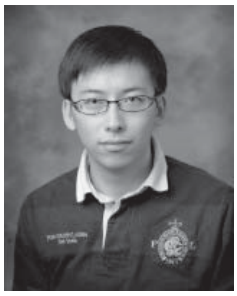
Dr. Prasad received his Ph.D. in 1980 under the supervison of Dr. M. J. Crocker and currently works for Stevens Institute of Technology in New Jersey.

In the picture, Dr. Prasad is receiving his OEA from Mr Jeffrey Fullerton INCE Vice President for Honors and Awards.

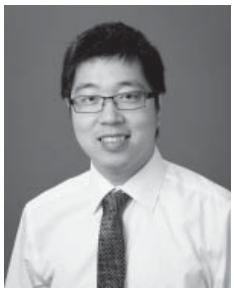
People News (continued)

Student Honors & Awards

Three Herrick students received student paper awards at the Noise-Con 2016 conference, held in Providence, Rhode Island. **Tongyang Shi** received the award for his paper, "The use of wideband acoustical holography for noise source visualization", and **Jiawei Liu** received the award for his paper, "Noise source identification based on an inverse radiation mode procedure". Both students are working toward their Ph.D.'s under the supervision of Prof. J. Stuart Bolton. Jiawei is doing his research while working for Cummins. In addition, **Daniel Carr,** who is doing his Ph.D. with Prof. Patricia Davies, won the "Classic Papers in Noise Control" competition. Each of the students were awarded $1000.



Tongyang Shi



Jiawei Liu

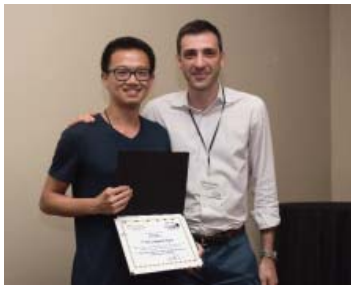
Daniel Carr

Seven other Herrick students received student paper awards at the Purdue Conferences held this past summer at Purdue University (see article on page 1).

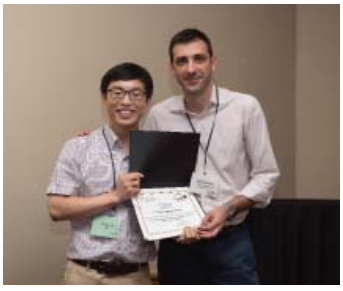
High Performance Buildings Conference : 1st Place - **Jie Xiong** (supervised by Prof. Thanos Tzempelikos); 2nd Place - **Seungjae Lee** (supervised by Prof. Thanos Tzempelikos); 3rd Place - **Jaewan Joe** (tied with another student) (supervised by Prof. Panagiota Karava)

Compressor Engineering Conference: 3rd Place - **Davide Ziviani** (supervised by Prof. Eckhard Groll)

Refrigeration and Air Conditioning Conference: 2nd Place - **Nelson James** (supervised by Profs. Jim Braun and Eckhard Groll); 3rd Place - Co-authors **Akash Patil and Andy Hjortland** (supervised by Prof. Jim Braun)



Jie Xiong (left) with Thanos Tzempelikos



Seungjae Lee (left) with Thanos Tzempelikos

Jaewon Joe (left) with Thanos Tzempelikos

Davide Ziviani (left) with Travis Horton

Nelson James (left) with Jim Braun

Andy Hjortland (left), Akash Patil (center) with Jim Braun

People News (continued)

Graduations

Felipe Accorsi (MSME, 2016), Experimental Characterization of Scroll Expander for Small-Scale Power Generation in an Organic Rankine Cycle. Felipe is now working for S-Ram Dynamics in Louisiana.

Giovanny Aguilera (MSME, 2016), Characterization of Particle Emissions from Desktop 3D Printers: A Look at the Effect of Part Design and Build Pathing. Giovanny's employment is not known at this time.

YeonJin Bae (Ph.D., 2016), Integrated Design Tool of Building System Optimization for Building Life Cycle Cost. YeonJin is working as a Post Doc at Herrick Labs.

Ying-Chieh Chan (Ph.D., 2016), Integrated Analysis of Building Perimeter Zones with Multi-Functional Façade Systems. Ying-Chieh is a faculty member at National Taiwan University.

Nicholas Czapla (MSME, 2016), Performance Testing of a Unitary Split-System Heat Pump Utilizing an Energy Recovery Expansion Device. Nicholas is staying to pursue his Ph.D.

Rohinish Gupta (MSME, 2016), Modeling and Control of a Parallel Through-the-Road Plug-In Hybrid Vehicle. Rohinish is now working for Cummins Engines at Columbus, IN.

Bonggil Jeon (Ph.D., 2016), A Method for Selecting HVAC Retrofit Solutions for Existing Small-and Medium-Sized Commercial Buildings. BongGil is working for LG Electronics in Korea.

Yangfan Liu (Ph.D., 2016), Efficient Modeling of Sound Source Radiation in Free-Space and Room Environments. Yangfan is currently working as a Post Doc at Herrick Labs.

Sylvia Lu (MSME, 2016), Improving Fuel Economy During High Load Diesel Engine System Operation Through Valve Train Flexibility. Sylvia is working for Cummins Engines in Indiana.

Domenique Lumpkin (MSME, 2016), Performance of an Air Cycle Heat Pump. Domenique is staying to pursue her Ph.D. at Herrick Labs.

Jacob Miller (Ph.D., 2016), The Thermomechanical Response of Composite Energetic Materials Under High- and Low-Frequency Mechanical Excitations. Jacob is currently working for Lawrence Livermore National Labs in California.

Chaitanya Panuganti (MSME, 2016), Control-Oriented Modeling, Validation, and Analysis of a Natural Gas Engine Architecture. Chaitanya took a position with CNH (Case New Holland) in Illinois.

Alexander Taylor (MSME, 2016), Modeling and Control of a Parallel Through-the-Road Plug-In Hybrid Vehicle. Alexander is staying to pursue his Ph.D. at Herrick Labs.

Sanjeev Venkatachalam (MSME, 2016), Modeling of Desiccant Wheel-Based Cooling System. Sanjeev is working for Semco LLC in Missouri.

Ashish Vora (Ph.D., 2016), Modeling the Impact of Battery Degradation Within Lifecycle Cost Based Design Optimization of Heavy-Duty Hybrid Electric Vehicles. Ashish is working for Tesla Motors in California.

Daniel Woods (Ph.D., 2016), On the Use of Mechanical and Acoustical Excitations for Selective Heat Generation in Polymer-Bonded Energetic Materials. Daniel is currently working for PC Krause & Associates in Ohio.

Donate to Herrick Labs

Donations to the Labs are always welcomed and appreciated. If you're interested in making a donation, below is some helpful information for you. For all of you who have contributed in the past: my sincere thanks. Your gifts help to create groundbreaking research and set a wonderful path to the future. Thank you for coming on board!

Be sure you specify your gift is for Herrick Labs. You are also welcome to support a specific professor's research, or support a few established funds:

* Herrick Laboratories Building Fund
* Herrick Laboratories General Operations
* Ray Cohen Excellence in Thermal Systems Fund
* William E. Fontaine Student Fellowship Fund

Giving by mail? Send your check to the address on back page of this newsletter, payable to the Purdue Research Foundation, with "Herrick Labs" and any additional designation on the memo line.

Specific questions about giving? (stock options, estate planning, deferred gifts, etc.) Purdue has philanthropy experts solely assigned to Mechanical Engineering who can help you! Contact the Director of Development, Scott Banfield at (765) 494-5629.

The New Acoustics Wing

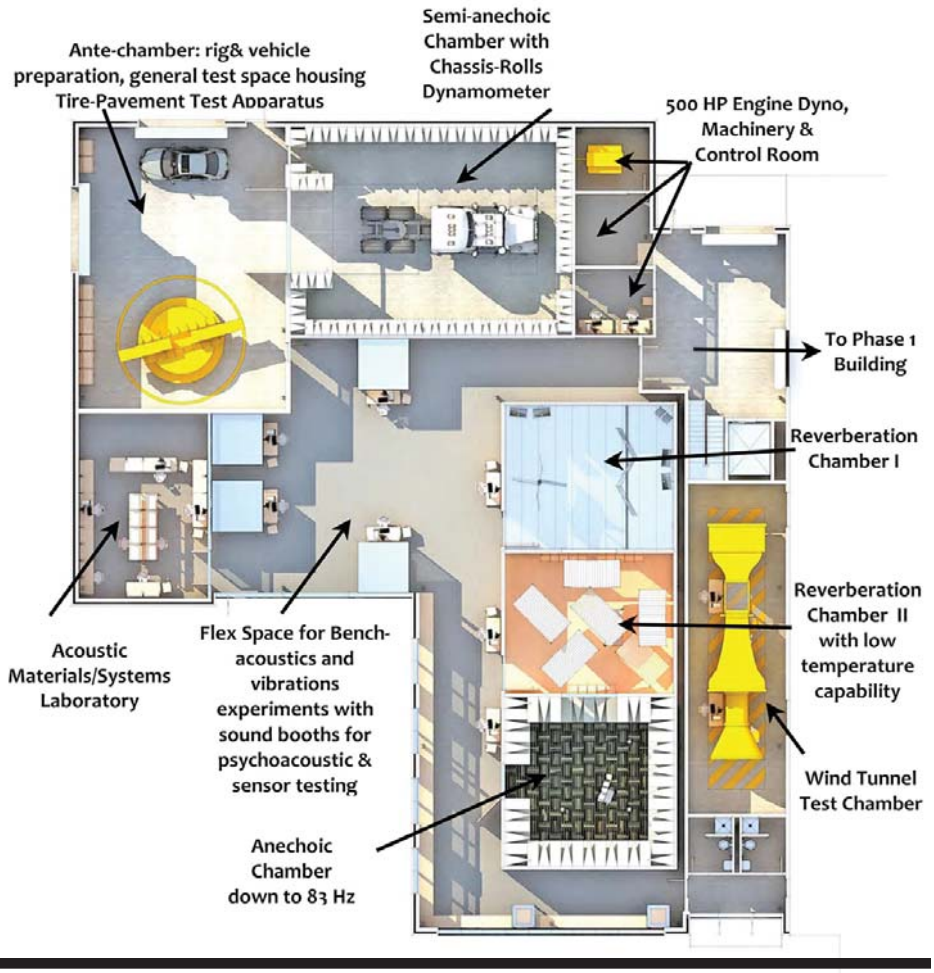
Noise is a big public health issue, as well as a quality of life issue. The number of people who suffer from hearing loss and are disturbed by noise (annoyed, find communication difficult, and sleep disturbed) is far too high. Also low noise, pleasing sounding products give companies a competitive advantage and thus there is a huge demand from industry for our students who have expertise in acoustics, noise control and effects of noise. The Acoustics and Noise Control Research Area remains in the original 1920s horse barn, which is in critical need of updating.

Phase II of Herrick's expansion will add a new Acoustics wing to the new 2013 building. The new custom-designed sound-testing facilities will enable an expansion of the types of noise control problems we can study. Features of the proposed new acoustics laboratories include:

* 1 anechoic chamber & 2 reverberation chambers, configured for sound transmission testing
* a semi-anechoic chamber with a flexible staging space and a chassis-rolls dynamometer
* an ability to test at lower frequencies in more controlled environmental conditions including more extreme temperatrures
* facilities that can be certified for standardized testing
* a dedicated acoustic materials laboratory with temperature and humidity control

With your support, we can make this state-of-the-art acoustic laboratory a reality. You can play a key part in educating the next generation of noise control and acoustics experts.

For more information on donating to the Labs, visit us at our website: https://engineering.purdue.edu/Herrick/partner#donate



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We are always interested in hearing your news, like weddings, births, and job promotions, and we want to be kept up-to-date on current addresses. Please send notes to Donna Cackley or to the e-mail address below. Don't hesitate to let us know of other alums that have moved or changed jobs. Photos are always welcomed and encouraged.

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