

eDimensions, May/June 2015



Dean's Welcome

May is always a special time for celebration and reflection about bringing another academic year to a close. These are extraordinary times in the School of Engineering and Technology at IUPUI. We started the fall 2014 semester setting an all-time enrollment record and ended the spring 2015 semester granting more baccalaureate and graduate degrees than ever in our School's history.

Knowing that students who earn our degrees have a lifetime of opportunity is a satisfying achievement. We are particularly grateful to our alumni, friends, and other supporters who have helped enable such student success and continue to support our School's advancement to be known as one of America's great metropolitan schools of engineering

and technology.

This issue of *eDimensions* highlights more examples of student and faculty accomplishments, and describes a new Ph.D. program in Music Technology that we hope to launch soon. On behalf of the entire School, I wish you a productive and enjoyable summer. I cannot wait to see the new records that will be broken and accomplishments of our students and faculty in the academic year ahead!

David J. Russomanno, Ph.D.



IUPUI places first in LITECAR Challenge

A Purdue School of Engineering and Technology faculty member and his graduate students at Indiana University-Purdue University Indianapolis won the \$60,000 grand prize in a competition to design a safe ultra-light vehicle.

The winning design, submitted by Andres Tovar, an assistant mechanical engineering professor and the students, was selected from among more than 250 conceptual designs submitted in the Lightweighting Technologies Enabling Comprehensive Automotive Redesign (LITECAR) Challenge. Their design was selected by a panel of experts in materials, crashworthiness, structures, manufacturing and safety. Students involved included Prathamesh Chaudhari: Computer Aided Design, Nishanth Bhimireddy: Crash simulations, Kai Liu: Structural optimization, and Fabian Lischke: Additive manufacturing.

The competition, sponsored by Local Motors, in partnership with the Advanced Research Projects Agency-Energy, was described as "setting up the challenge and letting the imagination begin" to develop innovative ideas by using novel material technologies, structural designs, energy absorbing materials and unique methods of manufacturing to reduce vehicle curb weight while maintaining current U.S. automotive safety standards.

Competition officials said the grand prize submission delivered "pretty much the entire package we were looking for," by effectively creating an exoskeleton over an aluminum frame to protect vehicle occupants.

The proposed vehicle design, called the Aerodynamic Water Droplet with Strong Lightweight Bone Structure, has the outer shape of a water droplet with an embedded trabecular bone-like structure, or spaceframe. The envelope's water droplet shape provides a low drag coefficient, while the spaceframe layout is designed to provide the mechanical strength and energy absorption capabilities required to protect the occupant in the event of a collision.

The envelope's material is a polymer composite, which provides desirable characteristics of a monocoque design. The spaceframe's material is functionally graded cellular aluminum alloy. The layout of the proposed spaceframe is designed using a specialized and unique topology optimization algorithm for crashworthiness.

“LITECAR has been critically important to Local Motors because it has stretched the boundaries of the world’s largest open-hardware innovation community to include a focus on the subject of weight reduction,” said John Rogers Jr., co-founder and chief executive officer of Local Motors.

About Local Motors

Local Motors is a technology company that designs, builds, and sells vehicles. From bytes-to-bits, the Local Motors platform combines global co-creation with local micro-manufacturing to bring hardware innovations, like the world’s first 3D-printed car, to market at unprecedented speed. Discover more at localmotors.com.



Robotics Football team plays at Robot Football Combine

A T-shirt sold at Indiana University-Purdue University Indianapolis boasts, tongue in cheek, IUPUI is undefeated in football since 1969.

The joke is that IUPUI, founded in 1969, has never fielded a football team. That may change this coming academic year, if the IUPUI Robotics Club has its way.

The club intends to double the number of robotic football players it now has to eight, meeting the required number of players to field an eight-member team in what might be called an intercollegiate robot football league.

The IUPUI robotics club took its four robot football players to Notre Dame on March 29 to play in the Robot Football Combine at Notre Dame. The Jaguars were pitted against teams from the University of Notre Dame, Valparaiso University, and Purdue University schools at Kokomo, Calumet and South Bend.

As it is on actual football fields, Notre Dame has been a leading contender when it comes to robot football. Two years ago, Notre Dame’s robot football team played in what is believed to be the first intercollegiate robot football game, beating Ohio Northern University.

Anna Glumb, who is studying electrical engineering at the Purdue School of Engineering and Technology at IUPUI and is president of the IUPUI robotics club, said the Jaguar robots competed in several skills tests during the combine.

One of the tests was for speed and another for accuracy in which the team’s quarterback had to throw passes to a robot receiver at designated spots on a playing field. A third test involved a robot pushing a weight across a line, while a fourth test determined the agility of a robot to maneuver through a cone course.

The IUPUI robots did the best on the accuracy test, placing third.

Glumb said the robots, about the size of a large computer printer on wheels, are powered by a 12v battery and controlled by the same kind of device used to control radio-controlled cars. The playing field is an indoor court. The ball is the size of souvenir-sized footballs. Sensors determine when the robots have been hit or tackled.

In addition to the quarterback, other skill players are a kicker, who has to send the ball up to 90 feet downfield and the center, who has to be able to hand off the ball.

“The team has to build the robots from scratch, with the exception of one part that is provided, to certain dimensions and with designated materials,” Glum said.

“I think it’s really cool,” Glumb said of working with the robot football players. “This provides an actual experience rather than an experience in a lab.”

Glumb said football won’t be the clubs only activity in the coming academic year.

The club plans to build a robot Jaguar that could be used for promotional purposes. It’s also considering working with a drone as well. Since the club uses a 3-D printer to make parts, it will be researching those devices as well.



IUPUI bestows appointment of Chancellor's Professor upon Yaobin Chen

Indiana University-Purdue University Indianapolis Chancellor Charles R. Bantz recently bestowed the prominent appointment of Chancellor’s Professor upon Yaobin Chen, director of the Transportation Active Safety Institute and professor and chair of the Department of Electrical and Computer Engineering at the Purdue School of Engineering and Technology at IUPUI.

The Chancellor’s Professor is the most notable appointment a faculty member can attain at IUPUI. It recognizes senior faculty members who display a record of extensive accomplishment and leadership in teaching, research and campus/professional service.

“Chancellor’s Professors are distinguished by at least 10 years of exemplary research and vital contributions as educators to student success,” Bantz said. “This appointment affirms Professor Chen’s substantial contributions to his field of expertise, the campus and university as well as my intention to seek his wisdom and counsel on matters important to the future of IUPUI.”

Chen’s research interests, for which he has gained international recognition, are in modeling, optimization and control of electric and hybrid vehicle systems; intelligent transportation and vehicle systems; and clean and renewable energy systems. Since his arrival at IUPUI nearly 25 years ago, Chen has had the vision, ability and determination to make significant research accomplishments, including securing the school’s first grant from the National Science Foundation in 1991.

Chen founded the Transportation Active Safety Institute at IUPUI in 2006. Under his leadership, the institute -- which

advances automotive safety research and development -- has received substantial external support, including a multi-million-dollar, multi-year award from Toyota Corp. The institute was also designated an IUPUI Signature Center -- a prestigious designation earned based on the institute's unique and distinctive research and scholarly activities.

Chen has also provided leadership and service to the broader IUPUI community through his work on numerous school, campus and university committees, including the Council of Associate Deans for Research and the Faculty Affairs Committee. He is also the founding principal of the Chinese School at IUPUI and the co-founder and president of the IUPUI Asian-Pacific Faculty/Staff Council.

Chen's service also extends to the greater Indianapolis community, where he serves on the Board of Advisors and Board of Directors for the Indianapolis Chapter of the American Red Cross, as well as holds positions on other community-based committees.

Over the years, Chen has demonstrated a career of sustained, exceptional achievement in teaching, research, service and leadership for the campus, the engineering profession and the community.

"Yaobin is an enthusiastic, highly motivated and productive individual who continually goes the extra mile to enhance the educational experiences of students, to motivate and provide opportunities for his colleagues through teamwork and to aggressively pursue an externally funded research agenda," said David. J. Russomanno, dean of the School of Engineering and Technology. "In all of these activities, he has brought distinction to the school, campus and university, and furthered the excellence in its undertakings."

Chen holds his master's and doctorate in electrical engineering from the Rensselaer Polytechnic Institute and earned his bachelor's degree in electrical engineering at the Nanjing Institute of Technology in China.



Ph.D. music technology program to be offered at IUPUI

The Indiana University Board of Trustees has approved a Ph.D. program in music technology at the Purdue School of Engineering and Technology at Indiana University-Purdue University Indianapolis.

One of the principal objectives of the program is to train graduates who will develop and research transformative new technologies in music and the arts, according to Debra S. Burns, associate professor of music therapy and chair of the school's Department of Music and Arts Technology.

Graduates will also explore the practices of designing, making and managing music technology, developing research methodologies in music technology, and integrating music technology in society and industry.

"The Ph.D. program in music technology addresses the comprehensive nature of the field, whose needs include designing new technological tools and techniques, leadership, business entrepreneurship, interdisciplinary research, and creative activity utilizing new and evolving technologies," Burns said.

Music technology degree programs have been proliferating throughout the country over the past few years. More

recently, it has started to emerge as an academic discipline internationally, Burns said. The Ph.D. program builds on the continuing success of the department's undergraduate and master's programs.

In addition to academic positions, graduates will be qualified for employment at a number of performing arts organizations and educational centers, such as Auralex Corp. in Indianapolis; Black Entertainment Television in Washington, D.C.; D'Addario Music Products in Farmingdale, N.Y.; MakeMusic Inc. in Minneapolis; Music for All Inc. in Indianapolis; National Arts Center in Athens, Greece; National Arts Center in Beijing; Ruth Lilly Health Education Center in Indianapolis; Scripps Network Interactive in Nashville, Tenn.; Seoul Arts Center in Seoul, Korea; and Sirius Radio in New York.

"The rise of technologies such as file sharing, portable computing and interactive media have transformed the very nature of how music is both created and experienced," Burns said. "It is expected that the Ph.D. program will produce academic and professional leaders capable of addressing a rapidly changing environment driven by continual development and integration of technology."

About Indiana University-Purdue University Indianapolis

As one of seven Indiana University campuses, IUPUI is known as Indiana's premier urban research and health sciences campus and is dedicated to advancing the intellectual growth of the state of Indiana and its residents through research and creative activity, teaching, learning and civic engagement. Nationally ranked by U.S. News & World Report, Forbes and other notable publications, IUPUI has more than 30,000 students enrolled in 17 schools, which offer more than 250 degrees. IUPUI awards degrees from both Indiana and Purdue universities. IUPUI—Fulfilling the Promise.