

## eDimensions, September/October 2015



### Dean's Welcome

The start of the fall semester always reminds our faculty and staff why we chose higher education as a career. In particular, we are recharged by the excitement of our first-time students who come to campus with their dreams and aspirations for improving our world. The entire faculty and staff of our School share a responsibility with our students to help them gain the knowledge and abilities needed to achieve their goals.

You will be inspired when you read more about Gillian Bundles, a freshman in mechanical engineering. In over twenty years in academia, I can think of no better example than Gillian to demonstrate the impact our donors are making to provide opportunities for highly

deserving students. Also, you will enjoy reading about Jose Pablo Segurola, a recent graduate whose accomplishments as a student athlete were truly remarkable.

This issue of *eDimensions* also highlights representative accomplishments and ongoing initiatives of our outstanding faculty. They are advancing student success through large-scale learning initiatives at the national level. In addition, faculty members from our School were selected to lead a national research project to develop electronics and sensors that flex and stretch, with applications that were unimaginable only a few years ago. We continue to support the health and life sciences mission of the IUPUI campus. One example is a recent research award focused on providing new ways to target diseases related to bone fragility.

As always, thanks for your outstanding support of our School as we continue our ascension to be known as one of America's great urban schools of engineering and technology.

David J. Russomanno, Dean



### New student finds home at IUPUI

Gillian Bundles is used to dealing with obstacles. The incoming freshman in the School of Engineering and Technology overcame major challenges to become the 2015 valedictorian of Broad Ripple High School, an achievement that merited financial support from the School of Engineering and Technology and the IUPUI Senior Academy.

Bundles also earned a spot in this summer's Diversity Scholars Research Program as a member of mechanical engineering faculty member Andres Tovar's research team, exploring vehicle safety.

But her biggest accomplishment was overcoming homelessness after her mother departed, leaving Bundles with her aunt, and relying on the support of family and friends that provided places to eat, sleep and study.

"Gillian has an amazing story," said Terri Talbert Hatch, the School of Engineering and Technology's assistant dean of student services. "She obviously is an excellent student, but to overcome the things she has faced in her life is truly

compelling. She doesn't let it define her."

Despite her status as a 21st Century Scholar, her college plans were up in the air throughout much of her high school career.

"I knew I wanted to stay in state. Plus, I've been in Indianapolis my whole life, and I love the feel of being in a city," Bundles said. The Indianapolis location, plus the School of Engineering and Technology's reputation in mechanical engineering, put IUPUI high up on her radar screen.

"I love physics, math and science. I wanted to pursue a career that involves circuitry and electronics," she said. "IUPUI offered me all of that."

A visit to the campus -- and a trip to the Campus Center -- sealed the deal. "It is such a great place," she said. "I felt at home right away."

Talbert Hatch arranged for Bundles to move into the Purdue House, one of the school's residential buildings in Riverwalk Apartments, for the Diversity Scholars Research Program. When the Summer Bridge program begins in August, she'll move into University Tower with other freshmen, and live on the Science, Technology, Engineering and Mathematics floor in The Tower.

Diversity Scholars Research Program, supervised by the Center for Research and Learning, teamed her with Tovar, and the work is both challenging and intriguing to her.

"It gives me so much to do, and allows me to be responsible for getting things done," she said. "It's been great to spend this summer living in the same place with students who are just like me, passionate about math and science and STEM programs. It will be fun this fall, too."



### IUPUI to collaborate with Purdue, state as part of \$171 million FlexTech manufacturing initiative

Researchers from Indiana University-Purdue University Indianapolis and Purdue University have been selected to co-lead a \$13 million Indiana node of a U.S. Department of Defense-funded initiative to develop electronics and sensors that flex and stretch.

Flexible hybrid electronics enable the integration of thin silicon electronic devices, sensors, communications and power on flexible substrates like glass, plastic, paper and human skin. Thinner wristwatches, personalized prosthetics, and more reliable robots and visual displays are among possible applications of the technology.

The defense department announced Aug. 28 that it had selected a proposal by FlexTech to establish and manage a flexible hybrid electronics manufacturing initiative. It is part of the National Network for Manufacturing Innovation program, an initiative of the Obama Administration to support advanced manufacturing in the U.S.

A research consortium and trade association based in San Jose, Calif., FlexTech is partnering with IUPUI, Purdue, the

state of Indiana and other organizations. Overall funding amounts to \$171 million: \$75 million from federal sources over five years matched by more than \$96 million in cost sharing from non-federal partners.

“There will truly be revolutionary developments associated with these technologies,” said David Russomanno, dean of the School of Engineering and Technology at IUPUI. “IUPUI is in a unique position to take advantage of a strong history of working with industry and not-for-profit partners, our collaborative relationship with Purdue University and being part of the Indiana University research community, which brings a strong life sciences perspective.”

As a leading research institution, IUPUI is pleased to be part of a consortium of the ‘best of the best’ scientists, engineers, and others in the field of flexible hybrid electronics, said IUPUI Chancellor Nasser H. Paydar. “By developing the building blocks of the next generation of electronics devices, this work will help ensure that America continues to lead in the new frontiers of manufacturing, increasing opportunities for well-paying jobs and a strong economy.”

With 15 researchers from schools at the IUPUI campus, the Integrated Nanosystems Development Institute will focus on improving the development and manufacturing of flexible hybrid electronics components and systems by leveraging its expertise in nanotech materials, batteries, and sensors and integration of flexible systems using scalable manufacturing processes. Among them, assistant professor of mechanical engineering Jong Ryu will contribute the formulation of nanoinks for printable circuits and his expertise in photo-thermal material process. Researchers have been working closely with industry partners to test new nanotechnology applications from diabetes monitoring to creating smart knee and hip replacements. IUPUI’s strong partnership with Battery Innovation Center will support the key role of batteries in these technologies. In addition to medical and defense needs, the planned research will yield benefits for automobiles, aviation, communications, consumer electronics, and agriculture.

“The technology development that will be realized from flexible hybrid electronics fits well with IUPUI’s strategic research plan focused on urban health and wellbeing,” said Mangilal Agarwal, who directs the Integrated Nanosystems Development Institute and will lead the IUPUI FlexTech team. “That strategy envisions numerous areas where flexible hybrid electronics will be applicable, like implantable and wearable smart sensors that can assist in improving daily lives by continuously monitoring human functions to administer life-saving treatments.”

As the nation’s leader in manufacturing and a life sciences industry that’s grown by \$27 billion in just over a decade, Indiana is the ideal place to develop these next generation, advanced flexible electronics manufacturing technologies, said Indiana Secretary of Commerce Victor Smith. “These types of collaborative initiatives between the state, private industry and Indiana’s top research universities are key to driving our economy forward.”



### NIH grant will fund IUPUI research into collagen's role in bone fracture resistance

A biomedical engineering researcher at Indiana University-Purdue University Indianapolis has received a \$419,000 National Institutes of Health grant to uncover why mechanical stimulation of bones increases their resistance to fractures.

Discovery of the biological mechanisms behind that would advance research on whether collagen's physical

properties in bone can be manipulated to increase fracture resistance in patients suffering from diseases related to bone fragility, said Joseph Wallace, assistant professor of biomedical engineering in the Purdue School of Engineering and Technology at IUPUI.

“We think, based on evidence in the lab, that mechanical loading is beneficial to bone function, but no one really knows how or why,” Wallace said. “The question this research is designed to answer is what is happening to drive that on a biological, molecular and cellular level?”

Most people think bones are static, he said. “Nothing could be further from the truth. Bone is one of the most metabolically active tissues in the body. It has the ability to rapidly change its size and shape according to the type of loading it encounters.”

When people walk or run, for example, they put a load, or force, on their bones. The bones sense this and respond. In the lab, mechanical loads can be controllably placed on a bone by a machine.

Over the past 10 years, researchers have turned their attention to collagen, a protein that exists in bone and other tissues in the body such as muscle, tendons and ligaments, Wallace said. Collagen in bones acts like steel bars in reinforced concrete, enabling bones to be more bendable without cracking.

“It’s now recognized that collagen may be as or more important than the mineral component of bone,” Wallace said. “Actually it is probably the interaction between collagen and the mineral that is most important.

Under the grant, Wallace will collaborate with IU School of Medicine bone researchers as he seeks to explain the biological mechanisms.

“Our hypothesis is that mechanical loading alters the expression and activity of collagen-modifying proteins and assembly/packing machinery that are affected in many matrix-related bone diseases,” he said. “The ultimate goal is to deliver a new understanding of mechanically induced adaptation in bone and to provide new ways to target bone disease through mechanical alterations to collagen.”

The research is expected to show that mechanical modulation of collagen is a practical method to prevent or treat disease-induced changes in bone quality and fracture resistance, Wallace said. It will challenge the current mineral/mass/architecture-centered dogma for controlling fracture, which neglects the contribution of collagen, Wallace added.



### Three from IUPUI named Faculty Fellows

Three IUPUI faculty have been selected among the first cohort of Faculty Fellows for the Association of American Colleges and Universities’ project to create a multi-state sustainable network of resource and innovation hubs and a national learning community of faculty fellows working to advance student success through large-scale student learning initiatives.

The selection of fellows was competitive across the first five states targeted for the project, said Kathy Johnson, who

will serve a one-year term as interim IUPUI executive vice chancellor and chief academic officer effective Aug. 16.

The three are among six Faculty Fellows selected for the project from Indiana. The IUPUI faculty include:

- Keith Anliker, senior lecturer and director, Laboratory and Curriculum Support, Chemistry.
- Elaine Cooney, chair of the Department of Engineering Technology, professor of Electrical and Computer Engineering Technology.
- Elizabeth Goering, associate professor of Communication Studies; director of Online Certificate in Human Communication in a Mediated World.

"I'm very proud that IUPUI has more fellows participating than any other institution," Johnson said. "It certainly bodes well for our campus and for the students whose lives are touched by the curricula that they help to shape."

The Faculty Fellows will share best practices for general education and lead faculty development activities to advance student achievement of key proficiencies that are important for post-graduation success and well being.



### Alumni Spotlight

Men's golf standout earns the league's top honor

Ed Holdaway (@EdHoldaway), IUPUI Sports Information

ELMHURST, Ill. - IUPUI men's golf standout Jose Pablo Segurola has earned The Summit League's top honor, being named the league's 2014-15 Scholar Athlete of the Year by the league's faculty athletic representatives. The award is the most prestigious annual individual honor given by the league. Segurola capped his collegiate career by winning the league's individual title in 2015, earning his second career NCAA Tournament berth. He was the league's male honoree while Western Illinois women's basketball standout Ashley Luke captured the women's honor.

Segurola joins IUPUI's past honorees Tiffany Kyser (basketball - 2002-03), Justin Wenger (golf - 2005-06) and Perez Agaba (soccer - 2010-11 & 2011-12) to become the program's fourth-ever recipient.

"I think it shows that hard work pays off," Segurola said. "A lot of guys on the team look up to me and I think this helps them see that hard work is rewarded. Being at IUPUI for five years, I had to overcome a lot. With my freshman year, I struggled a lot with the language. All in all, I overcame a lot over my career."

"I'm beyond happy for Jose," IUPUI Head Coach John Andrews said. "He's one of the hardest working young men I've ever been around. For him to come to the U.S. and overcome the language barrier in the classroom to become one of the best engineering students in the program is a phenomenal achievement."

"This award validates all of his hard work."

On the golf course, Segurola finished as IUPUI's all-time leader in rounds played (131) and played in two NCAA Tournaments. He was part of the Jaguars' stalwart 2012 team that captured the league title and he later authored a come-from-behind individual championship effort this past season. He was a 2014 First Team All-Summit League

selection and four-time Academic All-League honoree. In addition, he notched three career tournament wins and finished sixth on IUPUI's career list with a 75.52 stroke average.

"I'm really happy with how I played golf over my career. I thought I could've played better at times, but trying to balance golf with engineering was a tough test," Segurola said. "It's easy to play (golf) when it's nice outside. In order to be good at something, you have to be willing to do the extra things. That's what I think helped me the most."

In the classroom, Segurola maintained a 3.85 grade point average and earned his degree in Mechanical Engineering after being named the Most Outstanding Senior in Mechanical Engineering for the Class of 2015. He was an Alpha Lambda Delta National Honor Society honoree and named to IUPUI's Academic Advisor's List for 10 straight semesters.

He served the campus community as a member of IUPUI's Society of Hispanic Engineers and was an active member of the IUPUI Jags Reading Club and on-campus Ronald McDonald House. He also volunteered at the on-campus Paws Pantry Food Bank and was a recruiter for the IUPUI School of Engineering.

"My dad and my mom have done so much for me to be able to come to the states, I felt that I wanted to do something good for them to be proud," Segurola said. "They work very hard to provide for me, so this was my way of giving back."

Segurola intends on putting his engineering career on hold, instead pursuing a professional golf career.

"I'm looking forward to this next year," Segurola said. "It's always been my dream to play (golf) professionally."