SCHOOL OF INFORMATICS AND COMPUTING

INnovations

IU's Bicentennial Engineers

Intelligent Systems Engineering
comes to IU [p. 10]

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HAPPENING NOW

CUTTING EDGE

ALUMNI NEWS

Intelligent Systems Engineering at IU

Brad Wheeler

The School of Informatics and Computing is on the move. In our last issue of *Innovations*, Dean Emeritus Bobby Schnabel introduced plans for the stunning new Luddy Hall that will soon rise on Woodlawn Avenue. In this issue, I'll introduce the development of the first-ever engineering degree programs on the Bloomington campus.

With so much underway, I am honored to serve the School as interim dean to help advance these and other critical initiatives. For those who may not know me, I am an IU alumnus, tenured professor, and long-time member of the IU community. I've served as vice president for IT and chief information officer for all IU campuses since 2007, and I chaired the search in 2006-07 that recruited Bobby to the School. Over the years, I've worked with many of the School's faculty and been involved with tech start-up companies while also serving on the board of IU's technology transfer organization.

As we admit the first students into our new Intelligent Systems Engineering program, our alumni may be asking: why, after 195 years, is IU launching an engineering program? It is a journey worth understanding. Learn more about this process and President McRobbie's vision for Intelligent Systems Engineering on page 11.

ISE is now a department within the School of Informatics and Computing. The department is chaired by Distinguished Professor Geoffrey Fox, who will serve as the director of the Ph.D. program. Reflecting the interdisciplinary nature of the program, faculty from across campus are helping to shape the department.

You may still be wondering what "intelligent systems engineering" means. The program will focus on small-scale technologies including the sensors and devices that will fuel the "internet of things." It's projected that 25 billion devices will be connected to the internet in the next decade. These devices will impact many sectors including defense, medical device, pharmaceutical, health care, auto, and tech industries.

In time, six focus areas will further reinforce the emphasis and scope of the program:

- Bio and health engineering
- Computer engineering
- Cyber-physical systems engineering
- Environmental engineering
- Molecular and nanoscale engineering
- Neuro-engineering

THE PROGRAM WILL FOCUS ON SMALL-SCALE TECHNOLOGIES INCLUDING THE SENSORS AND DEVICES THAT WILL FUEL THE "INTERNET OF THINGS."

Just as the visionary formation of the School of Informatics in 1999 has now demonstrated a profound and long-term gain for education and research at IU, the creation of Intelligent Systems Engineering promises again to push our great university toward meeting the ever-changing needs of the state, nation, and world. I invite you to read more about this program and others in the pages that follow, and please join us as we continue to develop this world-class school.

Brad Wheeler
Interim Dean

HAPPENING NOW

President McRobbie and first lady pledge $1 million to fund endowed professor positions

IU President Michael A. McRobbie and his wife, Laurie Burns McRobbie, have pledged $1 million to endow two professorships on the IU Bloomington campus.
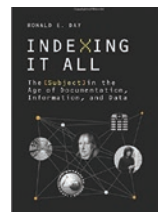
Their gift will endow a professorship in computer engineering in IUB's new Department of Intelligent Systems Engineering in SoIC, as well as a professorship in global strategic studies in the School of Global and International Studies.

This latest gift also reflects the McRobbies' personal and professional interests. President McRobbie, a computer scientist by academic background, came to IU in 1997 as the university's first vice president for information technology before becoming president in 2007. As president, McRobbie commissioned the creation of IU's first international strategic plan that has resulted in targeted and ambitious engagement on the part of the university in more than 30 countries around the world.

"The Intelligent Systems Engineering department within the School of Informatics and Computing and the School of Global and International Studies are vitally important components of the broad academic transformation currently underway on the Bloomington campus," President McRobbie said. "Laurie and I are extremely pleased to be able support the development of these programs by helping IU attract world-class faculty to the campus."

SoIC women inspired at Grace Hopper Conference

The more people there are, the tougher it is to stand out in a crowd. The women of SoIC don't mind the challenge. In fact, they're thrilled by it.

More than 12,000 women attended the 2015 Grace Hopper Celebration of Women in Computing Conference in Houston in mid-October, a record-breaking number of attendees and a growth of 25 percent over last year's event. Sponsored by the Anita Borg Institute, the Grace Hopper Conference is designed to promote the research and career interests of women in computing.

A total of 54 SoIC women, including seven from the IUPUI campus, attended the event. Their experience resulted in internships, job offers, and an invaluable network of connections that will help the students along their career path. Just as important, the SoIC contingent was inspired by the sheer number of women in computing, and their confidence in their expanding field grew.

"This was one of the most amazing experiences of my life," said Ashley Hammel, a junior in informatics with a cognate in business. "Everyone should be able to have this type of experience, and I'm so thankful to SoIC for the opportunity. Grace Hopper showed me that we have to stand together and never let anyone tell you that you can't do something. If they do, prove them wrong."

Funding for SoIC's trip to Grace Hopper came from a variety of sources. Some students were funded by the School via an initiative to fund students to attend the conference. Donations to the fund from companies or individuals were matched by the School, allowing more SoIC students to attend. Other students were funded as an extension of their summer internships, while others paid for their trip out of pocket.

Visit gracehopper.soic.indiana.edu to learn more or make a gift in support of women in computing.

Schnabel honored with scholarship program

During his eight years as dean of the School of Informatics and Computing, Bobby Schnabel helped the School grow and reach new heights through his vision, his leadership, and his desire to see students excel during every step of their journey.

He will continue to support SoIC students long after he leaves Bloomington.

The Dean's Advisory Council recently announced the establishment of the Schnabel Scholars program, a merit-based scholarship for SoIC students. The endowment will allow Schnabel to stay in close contact with students while providing the financial support needed to help SoIC continue to grow.

"The concept was to honor him and everything he has accomplished here," said Assistant Dean for Development Tom Bewley.

"I was extremely touched that the DAC members would do this," Schnabel said. "What is most meaningful to me, beyond the support this will provide our students, is that I will get to have contact with the students who receive these scholarships. I greatly look forward to hearing from them in the future and learning of their experiences in our school, and I am so grateful that this generous scholarship will also give me another ongoing connection with SoIC."

The endowment honoring Schnabel's indelible impact has already built a solid foundation of support. The response from donors has been strong, and the future of the program is bright.

Schnabel became CEO of the Association for Computing Machinery (ACM) on November 1.

For information on how you can contribute to the Schnabel Scholars program, contact Tom Bewley at tbewley@indiana.edu.

HCI alum lands on Forbes' prestigious "30 under 30" list

Tarun Gangwani

Tarun Gangwani has always dreamed of making a huge impact in technology. He just didn't realize it would come so quickly.

Gangwani, a 2013 graduate of the master's program in human-computer interaction at IUB, landed a spot on *Forbes's* "30 Under 30" list that identifies the brightest stars under the age of 30. Gangwani was selected from over 10,000 nominated professionals in the "Enterprise Tech" category, highlighting those using technology to expand what's possible.

He was hired by IBM as a designer and soon became a design team lead for IBM's Bluemix platform. Bluemix, a cloud developer platform, is the largest Cloud Foundry deployment in the world. After working as a design lead, Tarun moved into an offering management position in which he leads the strategy, execution, and quality of offerings across IBM's nine billion dollar cloud portfolio.

"When I was a design lead, I would always think about the business angle, how my product came to be, and how it was delivered," Gangwani said. "I think most designers do a little product management without really realizing it. I am naturally evolving my skillset by moving from a design-focused role to my role as an offering manager. I love it."

OF NOTE

IUPUI receives $405K IT workforce development grant by State of Indiana

The School at IUPUI received a $405,495 Skill Up Indiana grant from the Indiana Department of Workforce Development to support its Informatics Diversity-Enhanced Workforce program, a unique initiative that prepares a diverse cross section of Indianapolis high school students for careers in information technology.

"The Skill Up grant will provide significant program support to the iDEW program, which builds an IT talent pipeline in Indiana through innovative project-based learning over the four years of high school," said Mathew Palakal, executive associate dean of SoIC and program director for iDEW.

"The program's "wraparound" approach gives high school students in at-risk populations access to skills workshops, internships, professional certification training, campus and tech company visits, and special events," Palakal said.

In its pilot years, the iDEW program has been working with students in three Indianapolis high schools to increase their interest in, and access to, careers in technology.

The school is one of 13 recipients of more than $11 million in Skill Up Indiana grant funds that were announced by Governor Mike Pence.

Palakal said the program will continue to thrive through the support of outside partners like the Department of Workforce Development and others.

SoIC, IU advanced computing featured at SC15

Indiana University's computing and networking innovation, research, and discovery was on display at the Supercomputing 15 Conference (SC15) in Austin in November.

The annual supercomputing conference attracts thousands of scientists, researchers, and IT experts from around the globe to set strategies for the supercomputing technology of the future and share information about how supercomputing and cyberinfrastructure are transforming our lives.

IU's SC15 lineup delivered a range of exhibits, including SoIC's Center for Research in Extreme Scale Technologies (CREST), the Pervasive Technology Institute (PTI), and the Global Research Network Operations Center (GlobalNOC).

To raise awareness of the depth and breadth of its programs, the School hosted a research-oriented booth. Highlights included SoIC's latest technologies and research developments in big data, extreme scale computing, high performance networks, network science, security, and bioinformatics. The booth featured a variety of demonstrations and displays, including a student-engineered drone, a 3D printer, and the "HPX-box," a compact, power-efficient integrated system running the latest version of the HPX runtime software.

At SC, CREST announced the release of version 2.0 of the HPX-5 runtime system for petascale/exascale computing. This work was funded and supported by the Department of Defense, Department of Education, and National Science Foundation. The HPX-5 runtime system software library was developed to directly advance the goals of the National Strategic Computing Initiative established last summer by Presidential Executive Order for U.S. economic and societal benefit.

"Indiana University's rapidly growing School of Informatics and Computing continues IU's decades strong presence at SC," said Andrew Lumsdaine, SoIC associate dean for research and director of CREST. "The School's showcase initiatives at SC further illustrate the leading-edge research at SoIC, increase our ability to recruit top-notch researchers and students, and enable us to build connections to establish new partnerships. We are excited by the potential impacts and rewards of hosting an exhibit booth at SC, and doing so as SoIC prepares to launch its new graduate degrees in intelligent systems engineering."

Visitors to the SoIC booth connected with IU's world-class faculty representing a wide array of the School's research centers, including Geoffrey Fox and Judy Qiu from the Digital Science Center; Andrew Lumsdaine, Thomas Sterling, and Martin Swany from CREST; and Beth Plale from the Data to Insight Center.

MIS celebrates 20 years: 1995–2015

Howard Rosenbaum and Rob Kling, circa 1997

SoIC's Master of Information Science program commemorates its 20th anniversary this fall.

The late Rob Kling, the first MIS director and professor of information science, drafted a description of the MIS in a letter to prospective students in 1996:

"Information is the fourth resource. Already used to manage money, people, and equipment, organizations are recognizing the importance and necessity of developing strategies to deal with the increasing flow of information… Our MIS program will provide you with the intellectual foundations you need to keep current and develop an expanding lifelong career in the rapidly shifting information professions."

Twenty years later, the mission of MIS continues. The program is still focused on preparing individuals for successful careers in the evolving information field.

Current MIS Director Howard Rosenbaum worked with Kling to develop the MIS program that was launched in 1995 and has served as director since 2004. He notes:

"As the MIS program begins its third decade, we are entering an exciting stage. In addition to revising our curriculum to take advantage of new developments in technology and in the information professions, we have added new specializations aimed at some of the most exciting careers a student can pursue. Along with specializations in Information Architecture and in Data Science, we will soon have new options in IT Leadership, Digital Curation, and Digital Humanities. We expect to see our graduates continue to get great jobs throughout the information economy."

IUPUI students combine service learning, coursework, and real-world experience in Greece

This past summer, 11 students and two faculty members from SoIC at IUPUI traveled to the Greek Isles to use their knowledge of informatics to help preserve and celebrate the nation's culture and history.

Paros, the destination for the studies, is one of the Cyclades' most picturesque islands. It is known for its exquisite beaches, traditional villages, hilly countryside, vineyards, and incredible food. Today, the island is one of Greece's most popular destinations for international visitors.

The service-learning course, called "Documenting Historical Cultural Artifacts and Traditions in Paros, Greece," engaged students in the creation of a video about a unique archeological site on the nearby island of Despotiko. Students completed the project in three weeks, developing and producing all the necessary digital media including video, 3D animation, graphics, and photography.

Visit soic.iupui.edu/undergraduate/greece-study-abroad to view some of their work.

In the classroom, students met daily to discuss production techniques regarding the documentation of cultural artifacts and historical sites, as well as to provide updates on project management and works in progress. In addition to being immersed in the local daily life of Paros' main town of Parikia, students enjoyed archeological sites, museums, and a snorkeling trip.

Project leaders Albert William and Thomas Lewis, both lecturers in the media arts and science program, were pleased with the efforts of the students and the resulting videos.

"The residents of Paros expressed a great appreciation for all of the efforts that went into the project and how it has been able to bring a greater understanding of a little known, but very significant, cultural treasure," William said.

OF NOTE

Visual show "Monsters" features Media Arts and Science student work

The fall visual show "Monsters" in the IUPUI Campus Center showcased several examples of original creature creation works from Lecturer Mathew A. Powers' spring creature design course. This Media Arts and Science course is an applied theory class where students choose from three creation categories—2D, 3D, and storytelling—to bring their original creatures to life.

The class educates students on the principles of creature design to enable them to craft engaging creations that are appropriate for stories, video games, movies, television, and experimental media. Students complete the course with the ability to craft not only their own creatures but the worlds they inhabit and leave with a series of portfolio-worthy creations and accompanying written stories. Works included:

- Tensep by Olivia Mader
- Evolution: The Flying Mushroom by Yekaterina Komarovskaya
- Canyon Cremini, Portabata, and Mycotiel by Yekaterina Komarovskaya
- Cervulgaris by David James Perry
- Egantic by Kelly Johnson
- Gangler Hatchling by Josh Eckert

ILS's Fichman named Academic Leadership Program fellow

Pnina Fichman

Associate Professor and Chair of the Information of Library Science department at IUB Pnina Fichman was one of five faculty members selected to serve as a 2015-16 fellow for the Academic Leadership Program, which helps develop leadership skills of professors who may pursue careers in academic administration.

The program is sponsored by the Committee on Institutional Cooperation (CIC), made up of the 14 universities in the Big Ten conference and the University of Chicago. Participants will attend three seminars hosted by the CIC universities and will take part in campus-based meetings and programs with administrative leaders.

Other IU Bloomington fellows are:

- Shawn Gibbs, professor of environmental health and executive associate dean of the School of Public Health-Bloomington.
- Maria Elizabeth Grabe, professor of communication science and associate dean of the Media School.
- Michael McGuire, professor and executive associate dean of the School of Public and Environmental Affairs.
- Jamie Prenkert, professor and chair of business law and ethics in the Kelley School of Business.

"At IU Bloomington we know that we must invest in faculty to remain viable and competitive," said Eliza Pavalko, vice provost for faculty and academic affairs. "The Academic Leadership Program leverages the resources and expertise of CIC member institutions to develop the leadership necessary to maintain a community of excellent scholars and teachers."

1,150 students shine at record-breaking Career Fair

The challenge to launching a great career is getting your foot in the door. It's a lot easier when someone holds that door open for you.

The School of Informatics and Computing at IUB held the doors to a bright future wide open for nearly 1,150 students who were searching for full-time jobs or internships during the Career Fair at the Bloomington/Monroe County Convention Center September 10. The event welcomed a record-number of employers and gave SoIC students an advantage in a competitive job market.

The students, however, did their part to impress employers.

"A lot of the students have really great resumes," said Jathan Haggard, a platform test engineer with Interactive Intelligence, a global provider of business communications and call center solutions for customer engagement and unified communications. "They know what they're talking about, and they seem really prepared. A lot of times we'll go to career fairs where people show up and don't really know what they want. A lot of the SoIC students know what they're looking for in a job."

Companies such as Salesforce, Kohl's, Cigital, Eli Lilly, ExxonMobil, Ford, General Motors, and Target were among the nearly 100 employers who were on hand in pursuit of SoIC's best and brightest. They found potential employees who were driven—and had the resume to prove it.

"We're looking for well-rounded individuals who have good academic experience and the right credentials, but we also want technical and leadership skills," said Jeff Lenz, an SoIC graduate who was at the fair as a recruiter for ExxonMobil. "There's a big IT presence in ExxonMobil, and we're looking for innovative employees who can transition into other roles. SoIC students come in with a lot of experience from a lot of different areas. That's really exciting to see because being a huge company, they can be applied to so many different areas."

Students on the prowl for internships or full-time jobs were blown away by the fair.

"It's amazing," said James Demetros, a senior in SoIC who was searching for opportunities as a technology consultant. "The amount of companies that are here is unbelievable. I've been here for four hours, and I've only touched one-eighth of them. I was excited to come here, and I'm even more excited leaving. I have gotten a lot of leads."

More than 230 students were interviewed by companies the day after the fair, and other students are hopeful their full-time or internship dreams will come true thanks to the 31 additional companies that held on-campus interviews during the fall semester. Last year, more than 1,500 interviews were conducted on-campus.

ILS goes to NASA's Jet Propulsion Laboratory

The NASA Jet Propulsion Laboratory (JPL) in Pasadena, California, had a distinct IU feel to it last summer. Two Master of Information Science students, Shivika Thapar and Nipurn Doshi, served internships as UX design researchers in the Instruments and Data Science Section. The students helped JPL design, improve, and iterate on new and existing tools and interfaces involved with projects related to dark web and bioinformatics.

"Being able to intern at JPL and NASA was a dream come true," said Thapar, a native of India who came to Bloomington to pursue her MIS in 2014. "I had the opportunity to work with some great minds. Most importantly, all the lab tours at JPL were really fascinating. It was really exciting to learn about the ongoing work for the journey to Mars (Mars Rovers) and explore more about the past, current, and future missions of JPL."

Doshi, who also came to IU from India in 2014, enjoyed learning about the groundbreaking technology being developed at JPL.

"My favorite part was getting introduced to the technology, learning, and playing around with them every single day of the three months I was there," Doshi said. "I also enjoyed working and networking with people having the brightest of minds."

Both traveled to Washington DC and San Francisco for project hackathons as part of the internship, and they encourage other students to pursue their dreams.

"Opportunities can come from any direction," Thapar said. "Make sure you grab them and keep learning something new each day."

IU's Bicentennial Engineers

INTELLIGENT SYSTEMS ENGINEERING AT SOIC

Engineering comes to IU

As we approach Indiana University's bicentennial, which we will celebrate during the 2019-20 academic year, the university is in the midst of one of the most extensive academic transformations in its history. In recent years, eight schools have been newly established or reconfigured, and a long-overdue engineering program has been established in Bloomington. The impetus behind each of these major changes has been to provide our students with the most relevant educational opportunities possible so that they are positioned for success in today's global marketplace upon their graduation.

In my 2014 State of the University address, I announced that we would explore the feasibility of establishing a program in intelligent systems engineering at IU Bloomington. In December of that year, an internal faculty committee chaired by Bobby Schnabel, then dean of the School of Informatics and Computing, submitted an outstanding report that concluded emphatically that the development of such a program was necessary to permit existing

Practice, and a broader national need for more graduates in the STEM fields of science, technology, engineering, and mathematics.

An external Blue Ribbon Committee, comprised of three highly respected and immensely experienced academic experts and leaders in engineering, reviewed the report of the internal task force; conducted extensive interviews with faculty, administrators, and others; and concluded that the development of an engineering program at IU Bloomington was critical to support the research needs of current faculty, to educate students effectively in the STEM fields and applied technology, and to foster collaboration with other research universities and programs within the state, and across the nation and the world. The proposal to establish the program was subsequently approved by the IU Board of Trustees and by the Indiana Commission for Higher Education. We will admit the first cohort of students in bachelor's and doctoral programs in the fall semester of 2016. Notably, the first class of IU Bloomington-

Michael A. McRobbie

labs and "commercializes" them through new companies, products, and services that generate jobs, as well as income for the university, and hence contribute to state and national economic development.

The addition of a new program in intelligent systems engineering will allow the Bloomington campus to reach its fullest potential in providing students with relevant and rewarding educational opportunities, and to support the very best research of our faculty. This new program, based on our strong traditions of critical analysis, creativity, innovation, and exploration, will substantially enhance our ability to increase Indiana's economic competitiveness and support a culture of entrepreneurism across the whole state.

As alumni and friends of IU's School of Informatics and Computing are well aware, the School was the first of its kind established in the United States, and it has grown rapidly while developing a reputation for excellence. The School has provided graduates with vital skills in information technology to business and industry in Indiana, and has contributed to the establishment of informatics degrees on all IU regional campuses, thereby making important contributions to the state's economic development. The establishment of a program in intelligent systems engineering is a momentous development for the School, for the Bloomington campus of Indiana University, and for the entire state of Indiana. All of us at IU look forward to welcoming the first students in this important new program and to the continued growth and success of the School of Informatics and Computing.

> THE ADDITION OF A NEW PROGRAM IN INTELLIGENT SYSTEMS ENGINEERING WILL ALLOW THE BLOOMINGTON CAMPUS TO REACH ITS FULLEST POTENTIAL IN PROVIDING STUDENTS WITH RELEVANT AND REWARDING EDUCATIONAL OPPORTUNITIES, AND TO SUPPORT THE VERY BEST RESEARCH OF OUR FACULTY.

academic departments and schools to attract the best faculty and students, and to allow the Bloomington campus to reach the full potential of its existing research and academic strengths, particularly in the sciences, technology, and the health sciences. An equally strong need for such a program was the unfulfilled demand in southern Indiana for more engineering graduates that was identified in a report from the Battelle Technology Partnership

trained engineers will graduate in 2020, IU's bicentennial year.

With the formation of its intelligent systems engineering program, IU Bloomington becomes the last of the 62 members of the American Association of Universities to establish an engineering program. Today, all research universities are expected to support an entrepreneurial culture of "building and making" that takes the innovations and inventions in their

Michael A. McRobbie
Indiana University President

From the chair

Geoffrey Fox

Since the Industrial Revolution, higher education has been preparing students for a future that did not yet exist. In fields from transportation to medicine to electronics to telecommunications, college graduates have launched inventive industries that changed the world. Closer to SoIC's curricular home, the computer revolution spawned the diverse industry of computing, including the higher education subset of computer science.

Anticipating the next age of invention, IU has created the Intelligent Systems Engineering program to be housed as a department within SoIC. For what soon-to-exist future will we prepare our students? Let's start with the so-called "internet of things."

It's anticipated that within the next decade, more than 25 billion devices will be connected to the internet. Smart devices will be embedded in a wide range of machines ranging from cars to medical devices and many more. There will be smart grids, smart homes, and smart cities. These devices and systems will produce and collect an enormous amount of data. The data will be transmitted through the internet and stored in the cloud. Data scientists will analyze and interpret the largest data sets in the history of the world.

It's a big and exciting vision. How do we put IU and SoIC on a path to prepare our students for the future? It begins, of course, with the faculty. More than 100 faculty, research scientists, and postdoctoral students at IU hold at least one degree in engineering. Many of those faculty have been enlisted in the effort to launch ISE. We are actively recruiting additional faculty with a global search, and we are currently processing 179 applications. We anticipate hiring 3-5 tenure-track faculty before fall, and an eventual 20-25 new faculty will be hired for the program in the coming 3-4 years.

THIS IS THE NEXT GREAT INTELLECTUAL REVOLUTION, AND IU WILL BE AT THE HEART OF IT.

Within SoIC and across campus, faculty are hard at work on the details of building the ISE program. Curriculum is being developed for the bachelor's and Ph.D. programs set to launch in the fall. Students can select from specializations in computer engineering and cyber-physical systems. These areas provide a range of career options for students. We anticipate adding additional specializations in coming years.

How can our alumni help? Spread the word. Explore at engineering.indiana.edu. Send us your best and brightest, be they colleagues, children, or grandchildren. This is the next great intellectual revolution, and IU will be at the heart of it.

Intelligent Systems Engineering at SoIC

Historic moment. As President McRobbie and Interim Dean Brad Wheeler pointed out in their articles, this will be IU's first venture into engineering in the 195-year history of the University. There are many faculty and staff who are working on the new Intelligent Systems Engineering program. All feel a sense of the historic opportunity it presents for IU and our School, but also for our region, state, and nation. The educational opportunities and research the program produces will be on the forefront of innovation for this century and beyond.

Faculty hiring. The program launch is being led by Distinguished Professor Geoffrey Fox with a group of faculty from across the Bloomington campus. One of the many goals for the current academic year is to hire 3-5 new faculty who will become the core of the Intelligent Systems Engineering Department. Applications for these faculty positions are robust, and it's anticipated there will be outstanding hires in a number of concentrations for fall 2016.

Student recruitment. Many staff are working to recruit top-flight students to both the undergraduate and graduate programs. Undergraduate and graduate recruiters have been deployed to spread the word about this new and exciting opportunity for students at Indiana University. The School's communication department has spread the word through an extensive, targeted digital campaign, and IU communications has produced highly engaging brochures.

Space. The fourth floor of the new Luddy Hall will be dedicated to the ISE program. In the interim, IU space planners have identified faculty office and graduate lab space at the Smith Research Center at 10th and the bypass, near the tech hub that includes the Cyberinfrastructure Building (CIB), the Innovation Center, and IU's secure computing "bunker." Undergraduate classrooms and labs have been identified in the Geology Building, across the street from SoIC's 10th Street headquarters. Both the undergraduate and graduate spaces will undergo major renovation before the fall semester.

Curriculum development. Considerable work is underway with current IU faculty to build both the undergraduate and graduate curriculum. The curriculum will be design-centered with a focus on key areas of engineering, and an emphasis on building and making. In short, the coursework will be exciting for the initial cohort of students.

The faculty comments on the following page reflect the cross-disciplinary work underway to build the curriculum and program.

Anne Massey

Technology innovation fuels economic growth and allows us to respond to 21st century challenges in areas such as health, energy, national security, and the environment. The ISE undergraduate program is explicitly designed to produce graduates who can design and build technology to meet these challenges and, importantly, make an impact on society.

Anne Massey, Intelligent Systems Engineering Co-Chair, Dean's Research Professor of Information Systems, Kelley School of Business

Flynn Picardal

The new engineering program offers unique and exciting opportunities that will link IU's expertise in the environmental sciences with existing and developing abilities in computer modeling, user interfaces, and big data capabilities which could lead to the development of new tools, devices, approaches, and systems relevant to environmental sensor development, atmospheric and hydrological modeling, and data analysis.

Flynn Picardal, Associate Professor, School of Environmental and Public Affairs

Katy Börner

ISE will empower students as well as faculty and staff at IU to understand, design, control, and govern multi-scale, socio-technical systems composed of human and machine intelligence, sensors, and actuators, linked via the "internet of things."

Katy Börner, Victor H. Yngve Distinguished Professor of Information Science, Director of the Cyberinfrastructure for Network Science Center

Martin Swany

We are clearly moving toward a world with ubiquitous, networked sensors, sensing ourselves and our environment. These technological advances will lead to an unprecedented understanding of the world around us. It is exciting to be a part of educating students who will drive those advances.

Martin Swany, Professor of Computer Science, Associate Director of the Center for Research in Extreme Scale Technologies

Bachelor's of Science in Intelligent Systems Engineering

Students will learn the essentials of engineering science, design, and practice, including creative problem solving and vital skills such as how to work on a team and communicate effectively. Our design- and build-centered, intelligent systems–oriented curriculum also includes course work and experience in essential technology approaches such as big data, computational modeling, intelligent systems, and user experience.

Students choose among three concentrations, which were developed with input from industry leaders:

- Bio and health engineering
- Computer engineering/ cyber-physical systems
- Molecular and nanoscale engineering

The B.S. includes a minimum of 120 credit hours of course work, including:

- Engineering core courses
- Engineering electives
- Engineering concentration courses
- Required math and science courses
- General education requirements, including electives

Ph.D. in Intelligent Systems Engineering

This program is at the forefront of 21st-century engineering, conducting research and developing applications for the small-scale, networked, and mobile technology that is changing the world.

From the start, our students will push the boundaries of what engineering can be—from innovating with big data and intelligent systems to tapping into synergies in hardware and software, including those inspired by living systems. Sensor and detector technologies, signal processing, and information and control theory, and user interface design are at the foundation of our design-centered approach.

In time, students will choose among six tracks, which were developed with input from industry leaders:

- Bio and health engineering
- Computer engineering
- Cyber-physical systems
- Environmental engineering
- Molecular and nanoscale engineering
- Neuro-engineering

Left to right: Randall L. Tobias, chair of the IU Board of Trustees; Fred Luddy; IU President Michael A. McRobbie; and IU School of Informatics and Computing Dean Emeritus Bobby Schnabel break ground on Luddy Hall.

Photo by IU Communications

SoIC-Bloomington breaks ground on Luddy Hall, announces $8 million gift

IUB celebrated a groundbreaking and announced the lead donor on a new building for the School of Informatics and Computing in October.

The $39.8 million, 124,000-square-foot building will accommodate the rapid growth of students, faculty, and programs at the School, and is expected to complete construction in fall 2017.

Private donations will fund at least $10 million of the building's construction, including $8 million from former IU student Fred Luddy, a member of the Dean's Advisory Council at the School and founder of ServiceNow, a Silicon Valley-based company that delivers cloud-based, automated IT help desk services.

The new building will be named Luddy Hall in recognition of the gift and in honor of the many IU alumni in the Luddy family, including Fred's mother, father, sister, and two brothers.

"As we break ground for Luddy Hall, we look forward to what will be a magnificent new home for a school that has been a prime example of how the manifestations of Indiana University's missions have changed quite dramatically in response to the needs of students and the demands of our state and nation," said IU President McRobbie, who spoke at the groundbreaking. "Designed to encourage collaboration and community, this facility will provide much-needed teaching and research space in light of the enormous growth our School of Informatics and Computing, the broadest and one of the largest schools of its kind in the United States, has undergone in recent years.

"We are profoundly grateful to Fred Luddy for his extraordinarily generous gift, which is testament to his belief in providing students with the skills they need to succeed and instilling in them the values and principles that will guide them in their careers and lives."

Rendering of Luddy Hall, perspective from the northeast

Other speakers at the ceremony were former Dean Bobby Schnabel; Associate Professor of Computer Science Jeremy Siek, and Elli Bourlai, a doctoral student in information and library science, and Luddy.

"This building is designed to encourage an atmosphere of both collaboration and community, and a culture of innovation and entrepreneurship, combining the best qualities of academia and the tech sector," Schnabel said. "So much of what happens at our school is predicated upon the right combination of people, technology, and applications—this new building will give our entire school the proximity, environment, and tools to collaborate and thrive."

Located along Woodlawn Avenue between Cottage Grove Avenue and 11th Street just north of the School's current 70,000-square-foot location, the new L-shaped building will be the first constructed in IU's Woodlawn Corridor, which will link the athletic facilities on the north edge of campus with the core campus.

Highlights of the new building include a 3,500-square-foot innovation center, a flexible incubator environment with space for existing and aspiring entrepreneurial projects at the School; and a 1,500-square-foot fabrication lab, or "fab lab," which will house maker technologies, such as 3-D printers, in a vibrant, hands-on space.

Other key building features are:

• A grand civic porch serving as the entrance to the building
• An atrium to connect the porch to the interior of the courtyard
• Paved plazas in the courtyard for outdoor dining, public gatherings, and seasonal events
• A 160-seat collaborative auditorium on the ground floor with views of the eastern courtyard
• A café open to the public with an extensive menu selection

Meet the man behind Luddy Hall

After a generous gift from Fred Luddy, in honor of the Luddy family, the new SoIC building will be named Luddy Hall. Fred founded ServiceNow in early 2004, served as its president and CEO until 2011, and is currently ServiceNow's chief product officer.

Although Fred's support has been instrumental in launching construction on Luddy Hall, there remains a wide range of naming opportunities within the new building. Whether you'd like to support a classroom, lab, conference room, student collaborative workplace, or our flagship auditorium, you can make a five-year pledge at a variety of giving levels to help complete Luddy Hall. Contact Tom Bewley, assistant dean for development, tbewley@indiana.edu.

• A 1,360-square-foot student community center
• A third-floor multipurpose conference and board room
• Seven classrooms ranging from 25 to 160 seats
• Three labs ranging from 25 to 35 seats
• Five labs dedicated to intelligent systems engineering
• 19 conference and focus rooms
• 264 graduate work stations
• 97 faculty offices
• 36 staff offices
• 21 undergraduate advising and career services offices
• 11 interview rooms

The four-and-a-half story, environmentally sustainable structure was designed by Connecticut-based architectural firm Pelli Clarke Pelli, in collaboration with the Indianapolis-based firm, Ratio. IU plans to pursue LEED Gold certification for the building.

SoIC researchers lead $1.2 million effort to unlock economic potential of maker movement
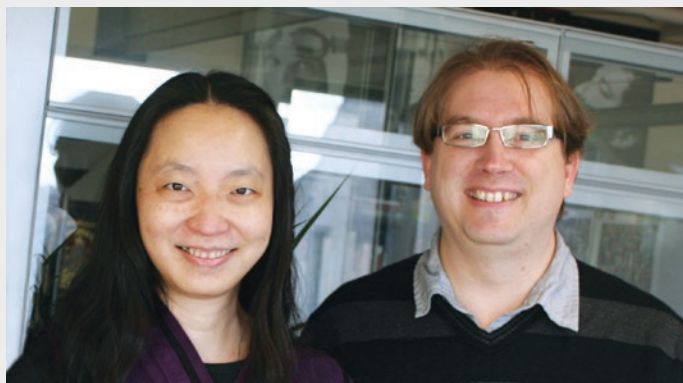
Shaowen Bardzell and Jeffrey Bardzell

Hacking, crafting, making, tinkering. A wide range of terms reflect a growing international culture of creativity related to making physical objects.

But two Indiana University Bloomington scientists say making isn't only a hobby. It's big business. And a new grant to IU shows the U.S. government agrees.

Shaowen Bardzell and Jeffrey Bardzell, both associate professors, were recently named co-recipients of $1.2 million from the National Science Foundation to study "making" as a potential driver of the U.S. economy. Silvia Lindtner at the University of Michigan is also co-investigator on the grant.

The project will focus on studying maker success stories in China, Taiwan, and the U.S. Midwest.

For the NSF-funded study, the researchers—both specialists in human-computer interaction—will spend the next four years documenting and analyzing policies and cultural practices supporting serious makers and maker spaces in China, Taiwan, and the U.S. Midwest.

Through extensive field studies in these countries, they aim to identify successful pathways that will guide making from a "hobbyist practice to serious business." They also will actively encourage cross-continental partnerships and the sharing of best practices between maker spaces by building connections between makers, scholars, and educators in Asia and the U.S.

They will personally conduct four summer school workshops—two in Asia and two in the U.S.—to bring these stakeholders together to produce how-to guides, kits, policy recommendations, curricula, and computer hardware supporting professional making. The summer schools will build upon a conference they previously organized at IU in 2014, titled "Making Subjects," with a series of presentations, round-table discussions, and hands-on activities with making scholars and practitioners.

CNetS receives top honors at CSS'15

The Conference on Complex Systems (CCS) made its first visit to North America, and the School of Informatics and Computing made its mark.

Researchers from SoIC's Center for Complex Networks and Systems Research (CNetS) earned multiple honors during the event, which was held in Tempe, Arizona last fall. The CNetS poster "The Rise of Social Bots in Online Social Networks" by Professor Filippo Menczer, Associate Professor Alessandro Flammini, former postdoctoral research fellow Emilio Ferrara, and Ph.D. students Onur Varol, Prashant Shiralkar, and Clayton Davis earned a Best Poster Award at the conference. The results depicted on the poster will also be presented in the paper "The Rise of the Social Bots," which will be published in the *Communications of the ACM* magazine.

Another paper, "Modularity and the Spread of Perturbations in Complex Dynamical Systems" by postdoctoral student Artemy Kolchinsky and Ph.D. student Alexander Gates, along with Professor of Informatics Luis Rocha, also won an award, as did the poster "Information Theoretic Structures of the French Revolution" by Assistant Professor Simon DeDeo, Professor of History Rebecca Spang, and Ph.D. student Alexander Barron.

CNetS earned its second Junior Scientist Award from the Complex Systems Society when former postdoctoral scientist Bruno Gonçalves, who is now a tenured faculty member at Aix-Marseille Université in France, was recognized for his contributions to the study of human social behavior from large-scale online attention and behavioral data.

IUPUI faculty conducts research to detect low blood sugar for diabetes

Anthony Faiola

Associate Professor of Human Computer-Interaction Anthony Faiola is among a multidisciplinary team of researchers at Indiana University-Purdue University Indianapolis that has been awarded a $738,000 National Science Foundation grant to develop a breathalyzer-type device to detect the onset of hypoglycemia, or low blood sugar episodes, in people with diabetes.

"Existing technology tracks current blood sugar levels, but it doesn't alert the patient to an upcoming hypoglycemic episode," said principal investigator Kody Varahramyan, senior aide to the chancellor and professor of electrical and computer engineering.

Hypoglycemia can be dangerous if it remains undetected. Children and the elderly with Type 1 diabetes are especially prone to sudden drops in blood sugar.

The three-year grant will fund research to:

- Identify the signature odorants that are produced in human breath by specific volatile organic compounds created by the metabolic processes that lead to hypoglycemia, or low blood sugar.
- Develop a nanosensor array to detect those odorants.
- Incorporate the nanosensor array into a portable smart device that transmits health information to the diabetic, caregivers, and family members.

Other investigators are Peter Roach, director of the Center for Diabetes Research, School of Medicine; Sudhir Shrestha, an assistant research professor in the School of Engineering and Technology; Amanda Siegel, postdoctoral research associate in the School of Science; and Dana Hardin, a pediatric endocrinologist at Peyton Manning Children's Hospital at St. Vincent.

The research is expected to improve health-monitoring options for people with diabetes, decrease health care costs, and improve lifestyles for diabetics.

SoIC scientists use Instagram to forecast top models at Fashion Week

Giovanni Luca Ciampaglia

At the start of Fashion Week in New York City, everyone wants to know who will emerge as the industry's next top model.

The answer may lie far from the glittering world of runways, magazine covers, and star-making designers. Researchers from SoIC predicted the popularity of new faces to the world of modeling with a better than 80 percent accuracy using advanced computational methods and data from Instagram.

The team then analyzed accounts of the 400 fashion models on Instagram, using the social media platform to catalog each user's number of followers, number of posts per month, number of "likes," and comments on those posts, and whether these comments were generally positive or negative. Data for the study was collected in fall 2014.

To test their ability to predict a model's popularity, IU researchers narrowed their focus to 15 models listed on the Fashion Model Directory as "new faces." Of the eight models expected to achieve the greatest popularity, six were accurately identified. Of the seven predicted to score lowest in popularity, six were also accurately identified.

When analyzing the more established model's Instagram accounts, the SoIC team found that a high number of likes and comments, as well as frequent posting, were associated with success on the runway, although the tone of the comments did not affect popularity. A higher than average number of posts yielded a 15 percent higher chance of walking a runway, but, surprisingly, more "likes" could lower these chances by about 10 percent.

"Social media is changing the game dramatically," post-doctoral fellow at SoIC's Center for Complex Networks and Systems Research Giovanni Luca Ciampaglia said. "Traditionally, models don't interact with consumers; but now their online activity plays an important role in popularity and, ultimately, success."
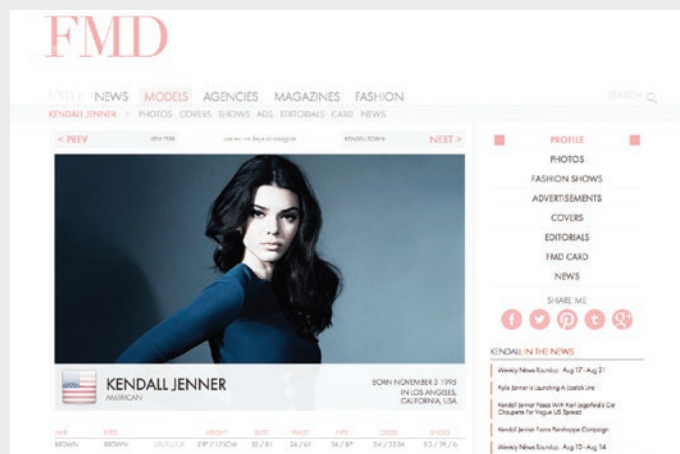

Photo by Fashion Model Directory

ALUMNI NEWS

ILS alumni spotlight: Jessi Gerdes

Degree: Master of Library Science, 2005

Career: Special Librarian, Yellowstone Association at Yellowstone National Park

Why's she a librarian: "It sounds trite, but it's really a love of books."

It isn't what Jessi Gerdes is doing with her life that surprises everybody. It's where.

Gerdes grew up in Valparaiso, Indiana, with a deep love of books. She was the kid who reveled in page turners, who resisted playing outside because she wanted 10 more minutes with the characters frolicking on the pages and filling her mind with wonder.

Everybody said she was going to grow up to be a librarian. Gerdes didn't believe them. She pursued an English degree at IU, and during the last semester of her senior year, she was trying to sort out what she wanted to do with her life. Gerdes took a class—what she calls a "what do you want to be when you grow up" course—where she was given an aptitude test. The results were clear.

"It said I should go into the Army, be a teacher, or be a librarian," Gerdes said. "I was already teaching at the time, and I knew I didn't want to do that. I definitely didn't want join the Army, so I decided on library school. It seemed like a good choice to me."

Her plan at that point was to be a children's librarian, preferably on the East Coast. Then she went west to visit her brother and took advantage of the trip to stop by Yellowstone National Park. She had never been to the national treasure before, so it was natural for her to take in some sightseeing.

She didn't expect to see her career path open in front of her.

"I found out they had a library," Gerdes said. "I found out they did internships. It went from there."

She spent two summers as an intern at Yellowstone while she earned her Master's in Library Science, and when Gerdes graduated in 2005, she accepted a job as a librarian at the park.

"I joke that it's about 75 percent cataloging, but that's actually fairly true," Gerdes said. "We do a lot of original cataloging because it's a special library, and we get very specific items for a very specific group of people. We do a lot of reference. We also answer questions from people all over the world."

Gerdes said she does just about every task that one might find at any typical library, but the items that are cataloged are varied.

"You would be surprised what people have done about Yellowstone Park," Gerdes said. "LPs, VHS, DVD, cassettes, microfilm, microfiche, newspaper articles—we get a ton of newspaper articles—theses, dissertations, regular books, brochures, journal articles, basically any kind of media. We digitize 35mm film. We've cataloged a whole bunch of 16mm film."

It took a while for Gerdes, a self-described "indoor person," to become comfortable in the park, but her love for the outdoors has continued to develop. Still, it's her work inside the library that thrills her the most, namely helping people find answers.

"The cataloging is fun, and it can be great in the winter when you can just come in, do your work, and go home," Gerdes said. "In the summer when it's chaotic, you get to talk to folks and hear all sorts of interesting questions. Last week I got a question about thermophiles. Earlier this summer there were questions about geysers and buffalo. Ghosts in the park. When roads were created. It's anything and everything."

Gerdes feels lucky that she landed such a great position out of graduate school, but then again, she made her own luck by pursuing an internship. She encourages others to do the same through either SoIC's Career Services or on their own—and sooner rather than later.

"If you know that you want to do it, try to get an internship," Gerdes said. "Try to volunteer. That's how I got my job. It's about putting in the time to build the experience you need to get a full-time job."

SolC student research gallery

Students on both campuses had an opportunity to showcase their research projects:

1: Mubeen Ahmed, MS'15 Human-Computer Interaction, Fall 2015 Capstone, IUPUI

2: Professors Katie Siek, Patrick Shih, and Associate Dean Esfan Haghverdi with informatics student Liam Bolling, Fall 2015 Research Symposium, IUB

3: Melissa McShea, MS'15 Media Arts and Science, Fall 2015 Capstone, IUPUI

4: Informatics student Ellen Lakin, Fall 2015 Research Symposium, IUB

5: Ross Beckman, BS'15 Media Arts and Science, Fall 2015 Capstone, IUPUI

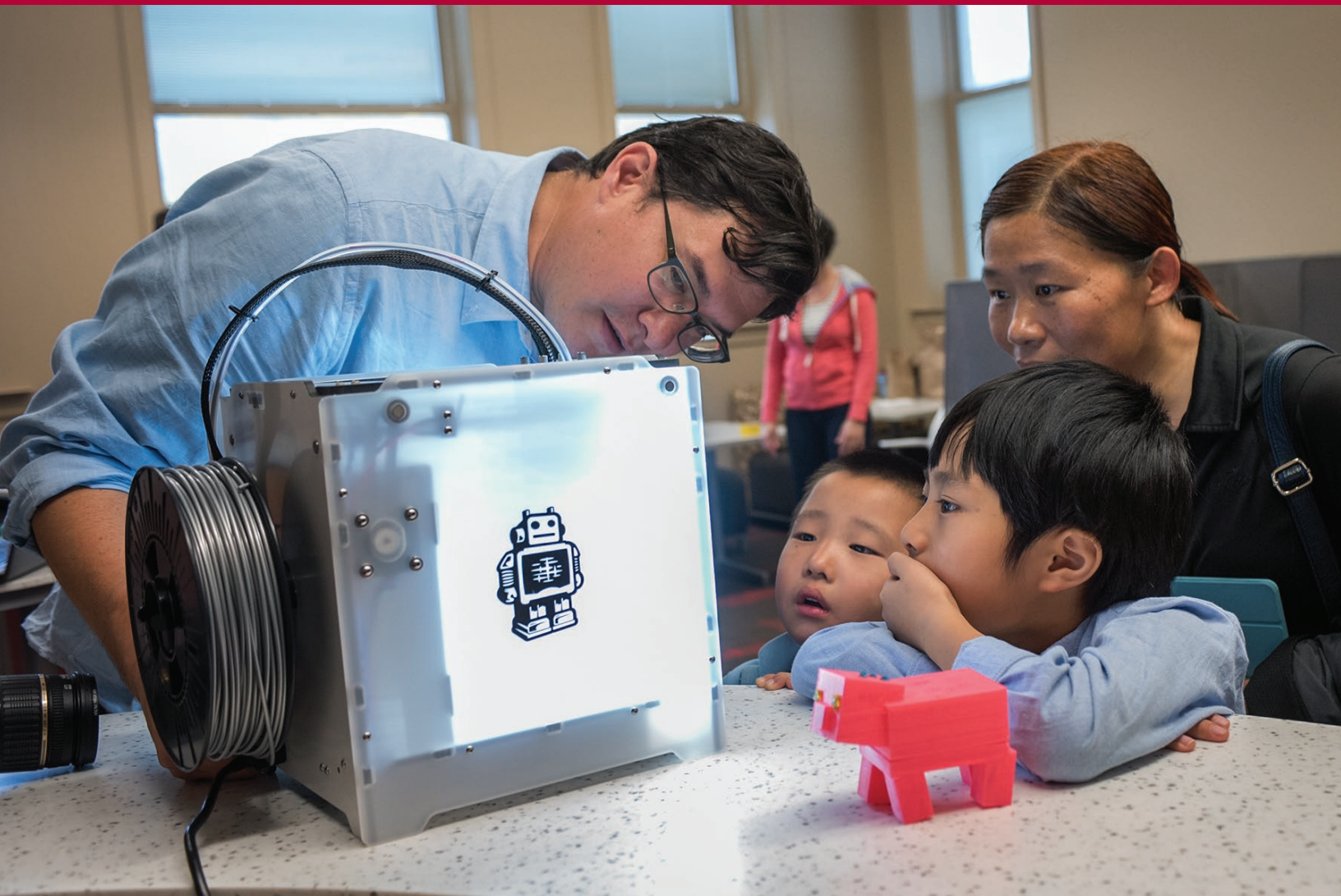6: Informatics students Esha Desai, Ben West, and Michelle Rollin, Fall 2015 Research Symposium, IUB

SoIC **SNAPSHOT**

SoIC participated in IU's annual Science Fest on October 24—a day dedicated to science learning for all ages. Activities included 3D-printer demos, interactive robots, coding games, and more.