

iit

ILLINOIS INSTITUTE OF TECHNOLOGY

magazine

Spring 2014

P A S S I O N
F O R
D I S C O V E R Y

.....
Research at IIT

LEWIS COLLEGE OF HUMAN SCIENCES
Fantasy-Fueled Fitness

IFSH High-Tech Lab
and Pilot Plant

CHICAGO-KENT COLLEGE OF LAW
Land Restitution in South Africa

Letter

from the President

“A discovery is said to be an accident meeting a prepared mind.”

—Albert Szent-Györgyi



For any university to be great, its faculty members need to be scholars as well as teachers. That means they must continue to hone their academic disciplines through research and other creative enterprises and to publish their findings. Even though excellent classroom teaching is their primary academic duty, faculty members also have a responsibility to extend the boundaries of knowledge because it is in this pursuit that the creative aspect of education is found and the seeds of innovation are sown.

Research—and other creative endeavors—has many starting points. It might begin as a question over coffee with a colleague and then move to a search of the existing literature to see what other scholars have learned about the issue or how they have approached a particular problem. The next step might be a study based upon observation of behavior or a laboratory experiment.

All good research, however, has certain things in common. It is rigorous, reproducible, and methodical. Publications are subject to peer review by experts; other researchers are able to follow the process and replicate the results. From the research come more questions, which will lead to additional discovery.

It is through research that important “life lessons” are also learned. Not all experiments are successful and not all good ideas will bear fruit. Collaboration will sometimes provide insight that escapes the lone practitioner. Small advances may be necessary before true innovations can emerge. And every answer comes with at least one more question.

At Illinois Institute of Technology, our undergraduate and graduate students are often full participants in the research studies initiated by our faculty, and sometimes they initiate the research themselves. They see firsthand how recognized scholars go about the task of advancing knowledge and creating new processes and things. Our graduate students, especially those pursuing the doctoral degree, understand that at this university they are indeed “standing on the shoulders of giants” and that after they graduate, they are expected to contribute to their fields and mentor those whose educational experience is just beginning.

As a professor of chemical engineering who has taught courses to students from the first year to the doctoral level, I have found that my research has kept me at the forefront of my field and energized about my profession. I worked hard to share this energy and excitement with the Ph.D. and M.S. students whose research I directly supervised and the many other students whose research I aided. While the results of our research are important and have had an impact on technology, I view the education of the student during the research process as the most important outcome.

There are many things about Illinois Institute of Technology that make me proud, and I am glad that I have never been asked to choose just one. However, at the top of my list would be the scholarship of our faculty, their commitment to advancing knowledge, and their ability to share with our students their passion for discovery.

It is to our nation’s research institutions and the students they produce that we must continue to look for the new ideas that will move our world forward, enhance our quality of life, and protect our citizens and environment. I have no doubt that the faculty, students, and alumni of Illinois Tech will be recognized among the major contributors of such new ideas in the years ahead. We are producing the “prepared minds” of the future.

A handwritten signature in black ink that reads "John L. Anderson". The signature is written in a cursive, flowing style.

John L. Anderson
President

contents

Spring 2014



10

ON THE COVER

Passion for Discovery

IIT researchers advance their disciplines, extend the boundaries of knowledge, and help to nurture the prepared minds of the future.

12

ARLEN MOLLER

Moving from Fantasy to Fitness

14

WESLYNNE ASHTON AND NASRIN KHALILI (Ph.D. ENVE '92)

Collaborating for Cleaner Production Practices

16

FOOD SAFE HOUSE/ HOW IT WORKS: IFSH Biosafety Level 3 Laboratory and Biocontainment Pilot Plant

20

FREDERICA DAREMA (M.S. PHYS '72)
Changing the Computational Science Landscape, *online exclusive*

21

STAN RUECKER

Seeing Conversation in Three Dimensions, *online exclusive*

21

DAVID McCORMICK

Op-Ed: Team Science

22

FRED HICKERNELL

Designing More-Reliable Algorithms

24

ALI CINAR

Advancing the Artificial Pancreas System

26

CARLO SEGRE

Helping Road Rangers

28

BERNADETTE ATUAHENE

Seeking Justice for the Landless

Departments

2 NEWS BRIEFS

30 ALUMNI NEWS

36 REWIND

IIT MAGAZINE ONLINE-ONLY CONTENT!

Read extended coverage of stories featured in the print edition as well as special online-only content at www.iit.edu/magazine

Correction: In the fall 2013 issue, "Ghanaian" was misspelled in the feature "Building a Library and Community in Ghana."

John W. Rowe, University Regent and chairman emeritus of Exelon Corporation, took over the campaign co-chair role from Alan “Bud” Wendorf (ME ’71), who transitioned into the role of chairman of the IIT Board of Trustees in October 2013. Together, Rowe and co-chair Joel Krauss (MATH ’71) are continuing to focus on campaign initiatives, including the planned \$40 million Innovation Center that will redefine how the university educates the next generation of innovative thinkers.

fuelinginnovation

THE CAMPAIGN FOR IIT

IIT’s six-year fundraising campaign, currently in its public phase, reached a milestone—surpassing the \$150 million mark—with \$154,204,353 raised as of January 15, 2014.

CAMPAIGN PRIORITIES AND PROGRESS

AS OF JANUARY 15, 2014

CREATE A TRANSFORMATIONAL INNOVATION CENTER

Goal: \$40 million

Progress: \$9,542,024

REVITALIZE CORE CAMPUS BUILDINGS*

Goal: \$25 million

Progress: \$19,667,929

PURSUE ANSWERS TO SOCIETY’S URGENT CHALLENGES

Goal: \$85 million

Progress: \$62,258,613

OPEN THE DOOR TO A TWENTY-FIRST CENTURY EDUCATION

Goal: \$40 million

Progress: \$26,279,840

BUILD IIT’S DISTINCTIVE ACADEMIC PROGRAMS AND ENHANCE THE CAMPUS EXPERIENCE

Goal: \$30 million

Progress: \$19,803,789

GROW RESOURCES FOR STRATEGIC AND OPERATIONAL CAPACITY

Goal: \$30 million

Progress: \$16,320,360

* Includes capital and expendable gifts for multiple renovation projects, equipment, supplies, and space.

This reflects progress through January 15, 2014; additional giving includes \$331,799, with funding initiative to be determined.

FUELING RESEARCH OPPORTUNITIES THROUGH FELLOWSHIPS AND SCHOLARSHIPS

With four renowned research institutes—IIT Research Institute (IITRI), Institute for Food Safety and Health (IFSH), Pritzker Institute for Biomedical Science and Engineering, and Wanger Institute for Sustainable Energy Research (WISER)—and more than 25 specialized research centers, IIT offers a wide and diverse range of research opportunities in varied disciplines. Providing access to such world-class research opportunities to faculty, graduate, and undergraduate students continues to be one of IIT’s core strengths.

Chris Pelliccione (M.S. PHYS ’12, Ph.D. candidate) is one such student. “I chose IIT for my graduate degree because I knew I would have access to advanced research opportunities and fellowships,” he says. A member of Duchossois Leadership Professor Carlo Segre’s research team at Argonne National Laboratory, Pelliccione is studying structural changes in new nanomaterials used in lithium-ion batteries. These materials can result in longer-lasting batteries that have large-scale applications, such as in the development of sustainable, cheaper, and more efficient electric vehicles.

More than \$60 million has been raised through *Fueling Innovation: The Campaign for IIT* for graduate and professional fellowships. Fifteen new endowed faculty chairs have been funded thus far, enabling the university to attract, recruit, and retain high-achieving students and world-renowned faculty.



Carlo Segre [left] and Chris Pelliccione

Visit fuelinginnovation.iit.edu to learn more about Pelliccione’s research and to read other stories about IIT alumni, students, and faculty who are changing the world.

IIT Community Welcomes New Leadership



PHOTO: MICHAEL GOSS

Alan "Bud" Wendorf (ME '71) is the new chairman of the IIT Board of Trustees. A veteran of the electric power industry, Wendorf retired from a 41-year career at Sargent & Lundy in December 2013. He was a company owner for the past 22 years and served as chairman and chief executive officer since 2004. A fellow of the American Society of Mechanical Engineers,

Wendorf has served on the board of directors of the Nuclear Energy Institute and the Construction Industry Round Table. Before assuming his role as IIT board chair, Wendorf co-chaired *Fueling Innovation: The Campaign for IIT* with Joel Krauss (MATH '71), who now co-chairs the campaign with John W. Rowe. Wendorf was instrumental in the recruitment of IIT students to Sargent & Lundy and along with his wife, Suzie, has supported IIT through scholarships, engineering education, and university initiatives.

The university community extends its gratitude to John W. Rowe, University Regent and former chairman of the IIT Board of Trustees. Chairman emeritus of Exelon Corporation, Rowe became IIT board chair in 2006 and has served the university in many capacities, including board service for the Wanger Institute for Sustainable Energy Research, the Mies van der Rohe Society, and the IIT International Board of Overseers.

IIT alumni have a new chair of the Alumni Association Board of Directors. **Andrea Berry (CS '84)**, senior vice president of Broadcast Media Services at FOX Networks Group, now heads the board in addition to serving on the IIT Board of Trustees and the IIT College of Science Board of Overseers.

Berry has spent her entire career in broadcasting, beginning with stints at NBC and CBS (where she was honored with two Emmy awards) before joining FOX; she currently oversees all aspects of digital media management for FOX, the FOX Sports Media Group, FOX Networks Group, Twentieth Television, and MyNetworkTV. With a passion for mentoring young adults, Berry established the Berry Family Scholarship Fund and the Garfield and Phyllis Jenkins STEM+ Outreach Fund at IIT. Berry succeeds Adrian R. Nemcek (EE '70), retired executive vice president of Motorola, Inc., who served as board chair for more than eight years. IIT gratefully acknowledges Nemcek's leadership role in rebuilding the Alumni Board and for his continued involvement in the university as a member of the Board of Trustees.



PHOTO: BONNIE ROBINSON

EMINENT ALUMNI HONOREES

Mobile phone pioneer Martin Cooper (EE '50, M.S. '57) and IIT Distinguished Professor Emeritus Dimitri Gidaspow (Ph.D. GT '62) each received prominent awards in late 2013.

Cooper was recognized with the Marconi Prize, given each year to individuals who have achieved advances in communications and information technology for the social, economic, and cultural development of all humanity.

Gidaspow, who has advanced the study of flow and fluidization, was honored with the AIChE Particle Technology Forum Award for his lifetime achievements.

PHOTOS: MICHAEL GOSS



[Left to right] Dongjie Chen, Chuan Shan, Yogasree N. Latha, and Chris Salgado prepare avocados for testing.

COLLABORATION

Turns Green Into Gold

Americans consumed an estimated 158 million avocados—enough to fill a football field 30 feet high and from end zone to end zone—during last year’s Super Bowl Sunday, according to the Hass Avocado Board. Chris Salgado (PS ’10), creator of Chris’s Awesome Guacamole, aspires to increase that height with help from IIT Institute for Food Safety and Health (IFSH) and the Interprofessional Projects (IPRO) Program.

Salgado had been serving his secret green concoction of more than 25 ingredients to family and friends before taking his guacamole to fans at large last spring. He posted a Facebook page on which he sold “The Modern Guac That Rocks!” merchandise and small batches of his guacamole. As the item’s popularity spread, bolstered by his second-place win at Brooklyn’s Guactacular 2013 competition in May, Salgado knew he needed to bump up his production process to a larger scale.

He recalled his positive IPRO experience as an IIT student and reached out to Professor Kevin Meade, his former IPRO instructor, who directed Salgado to Tom Jacobius, IPRO director of operations, and the course “Creating a Prototype Food Enterprise Development Center.” Co-taught by William Maurer, industry professor in the IIT School of Applied Technology Industrial Technology and Management Program, and Armand Paradis, IFSH director of business development, the course is the first hybrid IFSH-IPRO endeavor. The project joins IFSH food science and nutrition graduate students with IPRO undergraduates in developing the IIT Food Solutions Center, where small and medium-sized businesses can go for resources ranging from food safety issues to product ideation and design to co-manufacturing connections.

The class has been discussing a variety of structural options for the center, which they envision as being a much-needed go-to food resource for the greater Chicago area and eventually, the state. “One idea is to have an enrollment fee be part of the client package. Clients could become sponsors of the IPRO project and have the horsepower of IIT through the students,” says Paradis.

Chris’s Awesome Guacamole became a case study in the fall 2013 term of the IPRO, which began the previous semester and is part of the Urban Agriculture-themed cluster of IPROs that creates value for the urban agriculture movement through collaborative innovation.

“Our objectives were to draft a business plan, validate effective packaging, conduct market research, identify various obstacles in regulatory mandates, and work out growing pains,” says Salgado. “The main challenge was how to pasteurize my guacamole with high-pressure pasteurization. A safe alternative to thermal pasteurization, it retains the high quality of my guacamole.”

Salgado says that headway was made in many of the objectives, especially the pasteurization, which had great results and will undergo a second test phase.

—Marcia Faye

MORE  ONLINE

IPRO: <http://ipro.iit.edu>

Hass Avocados: www.avocadocentral.com

Scoring Points for Athletes



IIT student-athletes who aspire to slam dunk the winning basket, hit the ninth-inning homer, or sprint first across the finish line have a group of super-fans cheering on their efforts. But their fans extend beyond the stands and into a more unconventional venue—the Idea Shop at University Technology Park—where they participate in the academic version of a pep rally through the course IIT Pride: Improving Student Engagement for Sporting Events.

Originally conceived by a group of student-athletes in fall 2012 as an introductory-level course in the Interprofessional Projects (IPRO) Program, the current “IIT Pride” IPRO course was further refined for 2013 through a suggestion from Student Athletic Advising Committee leader Roma Mirutenko (PSYC 4th year).

“We wanted to foster athletic excitement at IIT and came to IPRO Director Jeremy Alexis to figure out how to have our own little bud and grow it into something bigger that reaches all around our campus,” says Mirutenko, who plays on IIT’s volleyball and lacrosse teams.

By the end of the fall 2013 term, that “bud” had blossomed into heightened athletics awareness and several ideas that could potentially supplement IIT’s athletics program: the prototype of more user-friendly features for the athletics website, a Google-based athletics calendar, posters that highlight the stories of individual athletes, and post-game activities offered by the Greek community. Scott Marks, head baseball coach and sports information director for the Department of Athletics, reviewed the students’ efforts mid-semester.

“This is such an exciting concept for students to take on,” says Marks. “We in Athletics are looking forward to the continued improvement of Hawk pride. The fact that current IIT students want to make sure all IIT students feel a strong connection to campus just shows how great the young men and women are whom we have here.”

Steve Hammond, course instructor and IIT Institute of Design adjunct faculty member, lets the students define what problems they want to solve around the general topic of Hawk pride and athletics, and, on a broader level, pride in the university.

“We talk about different preferences for problem solving and that it is a cyclic process of generating ideas and evaluating them,” explains Hammond. “The Idea Shop is a good environment for this; I keep things loose and let the students play.”

Hamza Shah (BIOL 3rd year) says that one of the major accomplishments his class achieved was spreading information about the IPRO project across campus. The size of the class this spring term has nearly doubled in enrollment.

“Increasing pride and building athletic traditions cannot happen overnight, but we have established a base for the next IPRO class and over time, results will show,” says Shah, noting that he expects an even-larger return on the IPRO’s investment beyond sports engagement. “Having a well-established athletics program would not only encourage the IIT community to come to the events but also has the chance to attract the outside community as well,” he explains. “That kind of support would help increase IIT pride and IIT awareness.”



MORE  ONLINE

Illinois Tech Athletics: www.illinoistechathletics.com

IPRO: <http://ipro.iit.edu>

The IIT community
welcomes 13
tenure-track faculty
members who began
teaching at the
university during the
2014 spring term

welcome



Alexander Boni-Saenz | Assistant Professor | IIT Chicago-Kent College of Law

Alexander Boni-Saenz's scholarship focuses on how legal doctrines and institutions can respond to the challenges and opportunities of an aging society. His scholarly work is interdisciplinary in nature and touches on several areas, including disability law, family law, health law, and trusts and estates.



Aron Culotta | Assistant Professor | IIT College of Science/Computer Science

Aron Culotta's research goals are to leverage the unprecedented source of social media data to advance research in automated processing of informal human communication, and to apply these techniques to analyze trends in social media and to produce socially beneficial technology.



Jennifer Cutler | Assistant Professor | IIT Stuart School of Business/Marketing

Jennifer Cutler's research focuses on marketing and management, incorporating elements from behavioral economics and computational social science.



Salim El-Rouayheb | Assistant Professor | IIT Armour College of Engineering/Electrical and Computer Engineering

Salim El-Rouayheb's research is in the area of information theory and coding theory. He is particularly interested in solving problems related to distributed data storage, information-theoretic security, and network coding.



Carrie Hall | Assistant Professor | IIT Armour College of Engineering/Mechanical Engineering

Carrie Hall's research areas include the modeling and control of advanced internal combustion engines and the development of clean alternative fuels and their efficient utilization.



Kevin Jin | Assistant Professor | IIT College of Science/Computer Science

Kevin Jin focuses his research efforts on cyber security, networking, and the modeling and simulation of large-scale computing/communication systems and networks, including the Internet and the Smart Grid.



David Minh | Assistant Professor | IIT College of Science/Chemistry

David Minh and his research group are primarily interested in developing new computational methods to quickly and accurately characterize protein-ligand interactions, especially binding affinities, and to apply these methods to design specific chemical probes for biological processes.



Tongyan Pan | Assistant Professor | IIT Armour College of Engineering/Civil, Architectural, and Environmental Engineering

Tongyan Pan conducts research in the interrelated fields of computational mechanics, to model the physical, chemical, and mechanical behavior of engineering materials, and sustainable infrastructure, to extend the service life of civil infrastructure and mitigate the environmental impacts.



Sonja Petrović | Assistant Professor | IIT College of Science/Applied Mathematics

Sonja Petrović focuses her research on the interplay between fundamental questions about statistical models and their relationship to algebraic geometry, combinatorics, and computation.



Jean François-Pombert | Assistant Professor | IIT College of Science/Biology

Jean François-Pombert's research focuses primarily on comparative genomics, with an emphasis on finding the elements that distinguish obligate pathogens from their free-living relatives.



Andrey Rogachev | Assistant Professor | IIT College of Science/Chemistry

Andrey Rogachev's expertise lies in various areas, including chemistry at magnetic centers, luminescence and bioluminescence, and the chemistry and physics of curved polyaromatic systems such as buckybowl and fullerenes.



Ankit Srivastava | Assistant Professor | IIT Armour College of Engineering/Mechanical Engineering

Ankit Srivastava's current research concerns wave propagation in nonlinear dispersive media with special emphasis on dynamic micromechanics, metamaterials, and phononics.



Jeff Wereszczynski | Assistant Professor | IIT College of Science/Physics

Jeff Wereszczynski's research focuses on the use and development of theoretical chemistry and biophysical techniques to further understand biomolecular processes and aid in rational drug design.

Research at IIT

Looking Toward the Future with Pride in the Past

By Dennis Roberson
Vice Provost for Research

Illinois Institute of Technology has a long history of contributing to a wide variety of research areas. From a quantitative perspective, under the leadership of my predecessor, Vice Provost for Research

Ali Cinar, academic research grant volume doubled over the last eight academic years from \$20 million in 2005 to \$40.5 million in 2013. A goal of the IIT Strategic Plan is to grow our academic research grant volume by roughly 50 percent over the next five years to \$60 million.

Our current research contributions and planned growth are built on the quality and dedication of our faculty, several of whom are featured in this issue of *IIT Magazine*. Their deep knowledge, great insight, creativity, and persistence are the driving force behind our research success.

Our research effort needs the strong support, high energy, and growing skill set of a large and talented cadre of graduate, and in some cases undergraduate, research assistants. This group performs the majority of the direct research tasks in the laboratory, in the field, and so often in our modern research environment, on the computer. Our success is also dependent upon the dedicated efforts of many individuals in university staff functions, including those in each of the colleges and the administrative offices, especially Finance (in particular, Grant and Contract Accounting) and Research.

The scope of our research pursuits is important. From its beginnings, IIT has been a pragmatic, results-oriented institution. Much of our research is focused on understanding and resolving today's real-world problems whose solutions will improve humanity over a relatively short period of a decade or so. In some instances, the impact will be felt in only a few years.

We seek to expand our ability to function successfully as research teams and as interdisciplinary teams. We are focused on enhancing our collaboration with researchers at other universities and look to increase and further elevate our collaborative efforts with such government agencies as Argonne National Laboratory and Fermilab.

Finally, we need to expand our engagement with key commercial enterprises ranging from global corporate giants to entrepreneurial startups in our University Technology Park as well as our local communities. Positive relationships with these groups will accelerate the impact of our discoveries as they are translated into policies, products, and services that will improve lives across the planet.

These are exciting times for research at IIT. I hope that as you read this magazine you will catch the excitement, feel a sense of pride in the contributions that have already been made, and look with anticipation toward the future.

PASSION

F O



PHOTO: MICHAEL GOSS

David McCormick

“Team Science”
Op-Ed

Ali Cinar

“Algorithm for an
Improved Quality
of Life”

Carlo Segre

“Range Warrior”

“Achieving Real Fitness
Through Fantasy Sports”

Arlen Moller

R DISCOVERY

Research at IIT



Nasrin Khalili

“Green—and Meaningful—
Manufacturing”

Fred Hickernell

“Problem Solver”

“Modeling Communication for Better
Understanding” *Online Exclusive*

Stan Ruecker

**Margaret
Juergensmeyer**

“The BSL-3 Whisperer”
Online Exclusive

Achieving Real Fitness Through Fantasy Sports

In 2013, nearly 34 million Americans played baseball, basketball, football, and hockey as well as assorted other games, without so much as even walking to the field, court, turf, or rink. They instead sat at their computers and participated in online fantasy sports, a hobby that presents both a conundrum

and an opportunity for IIT Associate Professor of Psychology Arlen Moller. If his research continues to provide promising results, many of these online fantasy sports fans might convert their couch-potato habits into fantasy-fueled fitness.

“Ironically, fantasy sports have traditionally been focused on paying attention to physical-activity data yet have been entirely sedentary for those playing,” says Moller. “A basic principle of this research involves taking people’s enduring enthusiasm for professional sports and leveraging that enthusiasm to help them become more physically active themselves.”

In a typical online fantasy sports game, participants act as team owners and assemble a roster of professional athletes. Fantasy teams earn points based on the performance of the professional athletes in the team’s roster and compete against teams managed by other fantasy owners. Team owners can control their team’s performance by trading players with other owners, adjusting their rosters each week, and anticipating which professional athletes will perform well.

Although many fantasy sports leagues include significant cash prizes for winners, according to a 2008 survey conducted by the Fantasy Sports Trade Association, fewer than 20 percent of owners listed winning money or prizes among their top five reasons for playing fantasy sports. Motivating factors most often include friendly competition, sports experience enhancement, and league camaraderie—forms of social interaction akin to what Moller has also observed.

“In online fantasy sports, message boards attract a high degree of social interaction,” explains Moller, who continues to play in the same two fantasy football leagues he has been in for the past dozen years. “That’s part of what’s so enjoyable about fantasy sports—people can have conversations over the course of the week about the sport itself or different athletes they are following.”

Social support from peers has also been identified as being one of the strongest predictors of success in programs designed to promote physical fitness. In a pilot of Moller’s Augmented Fantasy Baseball Study conducted over summer 2013, participants wore a triaxial accelerometer

designed to objectively assess their physical activity on a daily basis. After a baseline-recording period, Moller gave participants individually calibrated weekly goals, increasing their activity each week until all of them were

targeting the Surgeon General’s recommended level of physical activity. If they met that goal, they would attain privileges within the online fantasy sports game. Moller says the most important aspect of this study was that each participant’s activity results were recorded on a league online message board, a feature designed to stimulate online discussion.

At the conclusion of the 14-week study, on average, participants significantly increased their steps per week (11,364) from their baseline measurement (8,678). With feedback from this pilot group, Moller launched a 16-week Augmented Fantasy Basketball Study at IIT in November 2013. The top three fitness winners will receive cash prizes or Chicago Bulls tickets.

“An overarching principle that I work under is that when people are introduced to a lifestyle change, the context for change should be something they’re doing for themselves and something that they enjoy doing,” says Moller. “I’m hopeful that if people are considering change for these reasons, it’ll be easier to keep at it and maintain these changes over the long run.” ■

“An overarching principle that I work under is that when people are introduced to a lifestyle change, the context for change should be something they’re doing for themselves and something that they enjoy doing.”—Arlen Moller

MORE  ONLINE

Fantasy Sports Trade Association: www.fsta.org
Games for Health: <http://gamesforhealth.org>



Green—and Meaningful— Manufacturing

Green manufacturing is a hot topic worldwide and researchers have made significant strides in developing efficient production techniques. Yet the implementation of these advances has come in fits and starts, particularly among small and mid-size companies, and in economically developing regions such as Central America. Two Illinois Institute of Technology researchers are endeavoring to bridge the gap between university-level theory and common manufacturing practice with the help of a U.S. State Department-supported research project, Pathways to Cleaner Production in the Americas.





Stuart School of Business faculty members Weslyne Ashton and Nasrin Khalili (Ph.D. ENVE '92) are collaborating with colleagues from five other universities on the three-year project, which is backed by more than \$1 million in funding. The partner universities include schools in Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Peru, and the Dominican Republic, as well as New York Institute of Technology. During the

initiative's first 18 months, Ashton and Khalili focused on building relationships and sharing concepts among faculty at the participating universities. There were faculty training workshops in Costa Rica, El Salvador, and the Dominican Republic and a student-focused workshop in Peru. A conference in Chicago last August attracted attendees from nine partner organizations such as the Washington, D.C.-based World Environment Center, in addition to faculty from the six partner universities.

"It's been very rewarding to learn about the issues that these faculty partners face," Ashton says, "and then work together to address them." Her Latin American colleagues agree.

"It has been a great benefit to exchange our experiences, best practices, lessons learned, and obstacles to implementation," says Rosaura Pimentel Francisco, a member of the engineering faculty at Technological Institute of Santo Domingo, a partner institution located in the Dominican Republic.

Now Ashton, Khalili, and the team are turning their focus to research. Ashton's work looks at how market-based incentives and access to capital might spur smaller enterprises to adopt cleaner production practices. Khalili's research is concentrated on faculty and curriculum development, more specifically on the design of cleaner production educational models that can bring about the human capital needed to support sustainable development. Colleagues at partner institutions are leading two other research projects, one focused on the coffee industry and the other looking at whether experiential cleaner production learning opportunities benefit students when they hit the job market.

"We'd like our work to have a real-world impact, and that's what this is." — Nasrin Khalili

"These are pilot projects to identify problems and opportunities. The biggest contributions I hope we can make are to identify our core concepts as legitimate and to understand how to customize our strategy according to the context of each country," says Khalili.

The team's first research paper, which has been accepted for publication in the *Journal of Cleaner Production*, looks at two ways universities in Latin America can improve how they promote cleaner production. "We can't just be working on the theory [of clean production]. It's about actually getting the experience of going out to a factory, talking to the owner and the employees, and understanding the issues they're dealing with that might make it difficult to implement these theoretical recommendations," Ashton says. "That's an experience that most of our university partners have not had."

As part of that initiative, Ashton is making connections among Latin American universities and the administrators of nearby National Cleaner Production Centres in order to facilitate more direct engagement with industry. (NCPs are United Nations-supported clean-production training and advocacy groups.)

Thanks to the project, students are learning "the real situation of enterprises," says Yolanda Salazar de Tobar, executive director of the National Cleaner Production Centre in El Salvador, who believes that over the long haul the project will "increase awareness among students that environmental investment is profitable, and as they find opportunities to improve processes they will be change agents in Salvadoran industry."

That promise of effecting meaningful change drives Khalili and Ashton as well.

"We'd like our work to have a real-world impact, and that's what this is," says Khalili. "Our experience, knowledge, and training are paying off by taking this to the next level." ■

MORE  ONLINE

Pathways to Cleaner Production in the Americas: www.cleanerproduction-la.org

Weslyne Ashton [left] and Nasrin Khalili



by MARCIA FAYE

PHOTOS: MICHAEL GOSS

The unremarkable, plain-as-vanilla exterior of Building 91E, part of the IIT Institute for Food Safety and Health (IFSH) on Moffett Campus in Bedford Park, Ill., belies the intensity of the activity taking place inside this one-of-a-kind facility.

The building's first floor features the unique Biosafety Level 3 (BSL-3) Biocontainment Pilot Plant. With its companion BSL-3 Laboratory, the combined facility is specifically designed to study the behavior of pathogens in real-world food-processing conditions. The pilot plant can handle large volumes of hazardous agents affecting mainly produce and is outfitted with a room-sized flume for washing fruits and vegetables. It can also accommodate special equipment, such as an extruder for raw materials testing.

The building's second floor is equally noteworthy. "You know how big the furnace room is in your house?" asks Biosafety Officer Margaret Juergensmeyer. "Imagine if your furnace room had the same square footage as your house. That's what it takes to maintain a BSL-3 facility."

A complex resembling a silver-colored city populated by pipes, pumps, and pressure monitors, the mechanical room, according to Juergensmeyer, "is where all the magic happens that you don't see when you're downstairs." In addition to regulating heating and air conditioning for the building, the upper floor's many devices ensure that the laboratory maintains negative air pressure relative to surrounding rooms, so that air flows in only one direction—from clean to dirty. Air released from the building is purified there via a bank of giant HEPA filters. And if a door on the first floor is left open

109 AIRLOCK



FOOD SAFE HOUSE

too long, the Building Automation System will kick in to counterbalance the disturbance in air pressure. The mechanicals also make possible the containment necessary for the building's BSL-3 status.

"Containment is the focus of the entire building," says Juergensmeyer. "Anything—people, equipment, water, air—that comes into the building is cleaned and decontaminated before it goes out. It's layer upon layer upon layer of safety."

MORE  ONLINE

"The BSL-3 Whisperer" (profile of Biosafety Officer Margaret Juergensmeyer): www.iit.edu/magazine

"Keeping Cereal Safe" (joint project conducted in the BSL-3 pilot plant): www.iit.edu/magazine



HOW IT WORKS

Inside the IFSH Bioscience Laboratory and Biocontainment Plant



Enter secure interlock room and change into scrubs, rear-closing waterproof gown, autoclave-safe shoes, shoe covers, double-gloves, and hair cover. If working in BSL-3 Laboratory only, wear a powered-air purifying respirator hood.



Enter secure laboratory door accessed only by fingerprint sensor. A BSL-3 laboratory can be best described as a box with no known leak points: the entire room is sealed, including the space around every electrical outlet and sprinkler.



Workers exiting the plant must disinfect themselves in a seven-minute pass-through shower.

During projects, the plant is disinfected daily; sterilization is done using chlorine dioxide gas.

All drains in the plant empty into a monitored effluent-decontamination system. Waste liquid is first captured in a collection tank before entering a secondary tank where it is cooked for a couple of hours, cooled, and released into the sanitary sewer.

In the event of an emergency, dampers slam shut in approximately four to six milliseconds to make sure that air is not being delivered to the laboratories, which would cause over-pressurization.

WORKS:

safety Level 3 containment Pilot Plant



The BSL-3 lab contains common laboratory instruments such as an incubator, a centrifuge, freezers, and refrigerators, but bench work is performed in biosafety filter cabinets. All utensils are made of plastic, as broken glass is considered hazardous.



Work on common food pathogens (*E. coli*, *Salmonella*, *Listeria*, *C. botulinum*) is typically done in either the laboratory or the BSL-3 Biocontainment Pilot Plant.



If working in the pilot plant, enter secure door to suit room to change into Sperion full-body BSL-4 protective suits with steel-toe boots. A clear bubble helmet connected to an exhaust hose brings filtered breathing air to the person at all times. A voice-activated headset provides hearing protection and allows for communication. The suits have a five-year lifespan.



In the second-floor mechanical room, air comes in through a handler fitted with banks of filters that pre-filter the air, which is air-conditioned or heated and travels by ducts into the lab and other rooms. Gradually changing valves ensure that the programmed amount of air is properly delivered to each space. If someone opens a door and leaves it open too long, the valve will register a disturbance and re-adjust.

Air is pulled out of rooms through an exhaust system that travels into a giant bank of HEPA filters exceeding the standard required by international law. The facility has two exhaust fans; each can handle the entire building by itself.



PHOTO: MIKE OLLIVER / MIKEOLLIVER.COM



PHOTO: SUSAN LIEPERT

by DAVID CHONG

Model Citizen

IIT Magazine Online Exclusive:

Visit www.iit.edu/magazine to read a profile on Frederica Darema (M.S. PHYS '72), director of the Mathematics, Information and Life Sciences Directorate, United States Air Force Office of Scientific Research.

Although it may provide a compelling story line in a movie or television show, the image of a scientist working alone in an isolated laboratory is an historical artifact. There is no doubt that scientific research was performed using this approach for hundreds of years; in some fields, this single-scientist model of research persisted throughout much of the twentieth century.

More recently, it has become clear that multidisciplinary collaboration—or team science—is the most effective way to address many of our most important research challenges.

The complexity of research questions continues to increase. How do we address this complexity? Technology allows us to generate truly massive quantities of data in a single experiment. How do we reduce, analyze, interpret, and apply these data? Optimization of the design, implementation, and analysis of complex experiments often require the integration of contributions from a team of investigators with diverse scientific and technical backgrounds. Unfortunately, researchers with different backgrounds often speak different scientific languages. Poor communication may pose a critical barrier to effective collaboration.

This communication gap can be bridged through didactic programs that provide a broadly based scientific and technical education. Such programs are abundant at Illinois Institute of Technology. Perhaps the signature example of interdisciplinary instruction at IIT is the Interprofessional Projects (IPRO) Program, in which teams of undergraduate students from different majors work collaboratively to generate solutions to complex

MODELING Communication FOR BETTER UNDERSTANDING

Technology may have ushered in the age of Big Data, in which huge quantities of data drive the decision-making processes in commerce, academia, and science. But the discipline of design helps the public to understand and interpret this flood of information. Think of how infographics and interactive maps on the *New York Times* and other news sites transformed vast amounts of public data from the last presidential election into digestible and often-elegant visual models that illustrated how people voted based on their age, location, and other demographics.

While these kinds of visualizations may now be ubiquitous, much of the groundwork for their development was laid down years ago by researchers working in the fields of information design and communication design, including Associate Professor Stan Ruecker of IIT Institute of Design. The focus of his research is to help people more readily interpret and digest complex information.

Get the Full Story at IIT Magazine Online: www.iit.edu/magazine



problems. The program was considered to be cutting edge when it launched in 1995. Since that time, IIT has become a leader in interdisciplinary education. IPRO 2.0, the newest IPRO format, focuses on building students' skills in design thinking and innovation, giving them the opportunity to work on the same team and project for two semesters.

Another example of the increasingly interdisciplinary nature of IIT academics is the growing role of biology in engineering teaching and scholarship. Note the relatively recent (2002) founding of IIT's Department of Biomedical Engineering and the later (2006) addition of "Biological" to the name of IIT's former Department of Chemical Engineering.

Interdisciplinary research also continues to expand.

Leveraging an IIT strength in biophysics, the Biophysics Collaborative Access

Team program supports collaborative research

performed by investigators with expertise in physics, cell, and molecular biology, neuroscience, and physiology, among other fields. The Engineering Center for Diabetes Research and Education is home to an interdisciplinary effort to treat this family of diseases and prevent its complications.

At IIT Research Institute (IITRI), biologists are currently collaborating with electrical engineers to perform the world's largest program to identify possible health effects of exposure to radio frequency fields generated by wireless telephones. IITRI's inhalation toxicology and technology program represents a collaborative effort among aerosol scientists, biologists, and clinical scientists. IITRI scientists are also initiating a pilot program with a biomedical engineering faculty member to use targeted molecular diagnostic tools to study mechanisms underlying the success and failure of drugs being developed for cancer prevention.

Several of my own research programs have required the effective integration of the efforts of biologists, engineers, chemists, and clinical scientists. My personal experience is that success in research is achieved via collaboration—not by the lone scientist toiling late into the night in his or her laboratory.

Team science is here.

OP-ED

Team Science

by David McCormick, Director, IIT Research Institute

Problem} Solver

Thirty minutes west of Illinois Institute of Technology, at Argonne National Laboratory, lurks a gargantuan machine called “Mira.” The recently inaugurated supercomputer—one of the most powerful on Earth—boasts a peak performance of 10 petaflops, meaning it can execute 10 quadrillion (10^{16}) calculations per second.

Yet, according to IIT Department of Applied Mathematics Chair and Professor Fred Hickernell, lightning speed alone is not always sufficient for today's most demanding applications.

Hickernell works in the area of computational mathematics, often focusing on improving the underlying means by which calculations are performed. These stepwise recipes for solving problems are known as numerical algorithms. Fine-tuning them to improve their efficiency and reliability is critical for complex calculations in many branches of science and engineering.

One critical issue Hickernell has explored is that complex algorithms may fail to provide answers within specified ranges of error. Worse yet, it has often been impossible to predict when a program will perform a given calculation accurately and when it will fail, yielding spurious results.

“The sine function on your calculator can be trusted, because it’s very well understood,” Hickernell notes. “But the next simplest thing is finding the integral of a function, and up until our recent work in the last year, none of those algorithms had real guarantees.”

As Hickernell explains, problems involving many variables can be particularly stubborn to solve with speed and accuracy. In addition to myriad scientific applications, such calculations are critical for the world of financial risk management.

“Although one cannot simultaneously consider the infinite number of possible scenarios, one can get a good approximation

of portfolio performance or trading strategy success by generating thousands or millions of possible future scenarios and looking at the distribution of the outcomes,” he says.

Hickernell has devoted much of his mathematical career to this technique, known as Monte Carlo simulation, publishing numerous technical papers on various aspects.

Monte Carlo allows mathematicians to evaluate problems consisting of hundreds or even thousands of variables. The results of Monte Carlo scenarios are pooled and averaged. The process is suggestive of repeated random bets and outcomes in a casino; hence, the technique’s name.

In addition to conventional Monte Carlo simulation, Hickernell has worked with clever refinements of the strategy, including quasi-Monte Carlo, where the random sampling is more evenly spread across the space of possible outcomes, dramatically improving algorithmic efficiency.

“Instead of requiring a million simple random scenarios, one may be able to achieve the same accuracy with only 100,000 or even 10,000 low-discrepancy scenarios,” Hickernell says. In collaboration with Argonne, under a grant from the Department of Energy, Hickernell has been applying quasi-Monte Carlo ideas to the design of computer experiments that will improve nuclear reactor design.

Within the last year, Hickernell returned to the problem of algorithmic failures. In a recent breakthrough, he designed numerical

software for Monte Carlo calculations with rigorously guaranteed error bounds, giving users much greater confidence in the validity of their results. He and his collaborators have also introduced these concepts to a wider audience, through the release of the Guaranteed Automatic Integration Library. This software library includes guaranteed algorithms for Monte Carlo calculations and one-dimensional integration.

In the coming era, computers will be capable of exascale computation, performing a blistering 10 quintillion (10^{18}) calculations per second. Hickernell’s efforts to improve algorithmic efficiency and reliability will help ensure such computing power may be used to the best advantage.

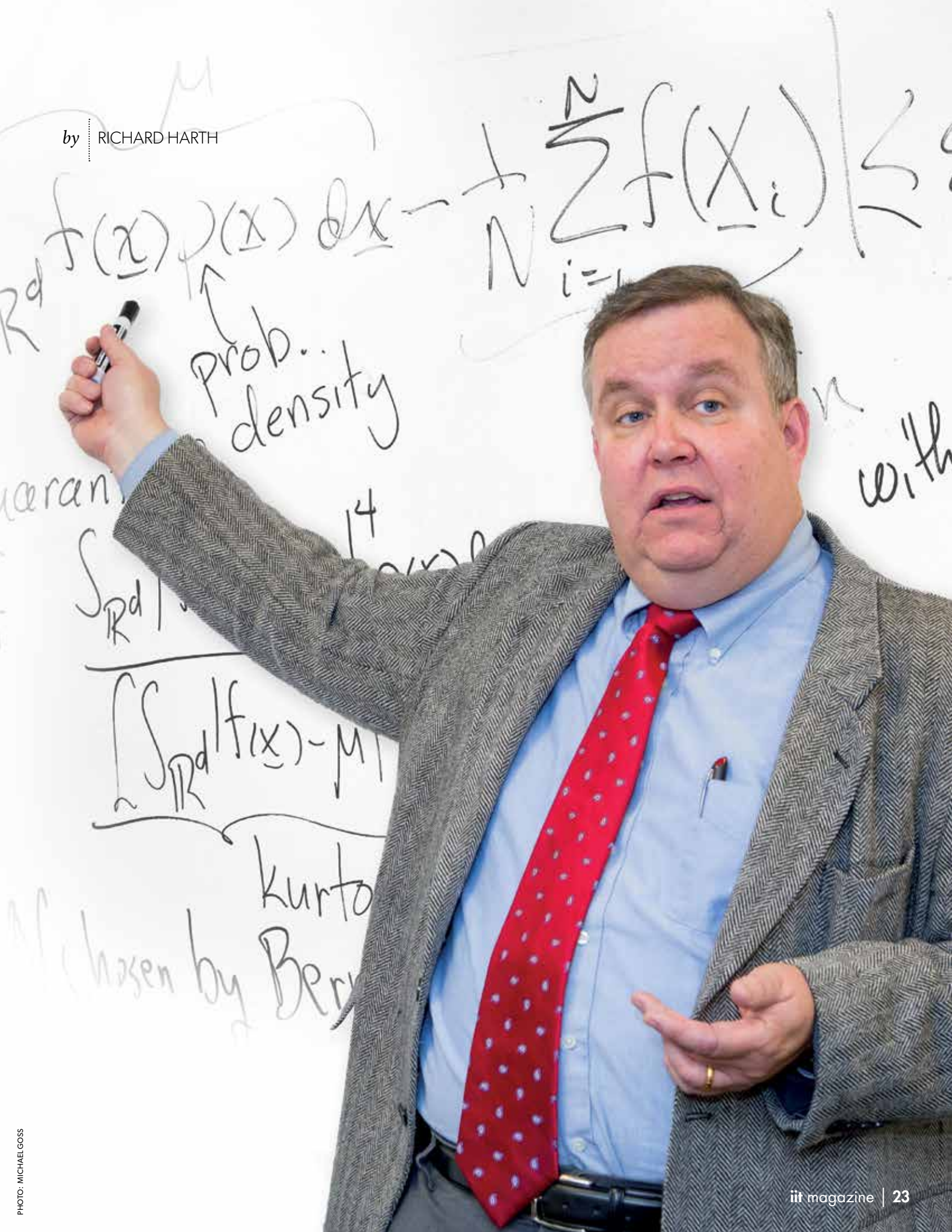
“A good piece of numerical software is like a well-designed vehicle, capable of transporting the user from a mathematical problem to its solution quickly, comfortably, and reliably,” Hickernell says. ■

MORE ONLINE

Guaranteed Automatic Integration Library:
<https://code.google.com/p/gail>

“Monte Carlo Methods—A Little History”:
www.youtube.com/watch?v=ioVccVC_Smg

by RICHARD HARTH



Algorithm for an Improved Quality of Life

by MARCIA FAYE

Derrick Nelson Jr. vividly remembers the day he almost died.

Nelson was seven years old and shopping with his grandmother when she noticed that his lips had become strangely white and his skin pale. That night, he wet his bed several times, but his mother attributed it to stress, since Nelson was being picked on at school. In the morning, she gave her son milk and some food, but he immediately vomited.

“My mom called my health care provider at the time and when she told him of my symptoms he said, ‘Bring him in to the hospital—it sounds like he might have diabetes,’” Nelson says.

When they arrived at the former Michael Reese Hospital and Medical Center, Nelson’s blood glucose level was almost 800 milligrams per deciliter (mg/dl). The normal range as determined by a randomly administered blood glucose test should be less than 200 mg/dl; anything over this is diagnostic of diabetes.

Now 23, Nelson manages his type 1 diabetes with a self-adjusting insulin pump that he wears around the clock. A team of researchers led by Ali Cinar, director of the IIT Engineering Center for Diabetes Research and Education, is working to ease the burden of insulin management in patients like Nelson. They are developing a fault-tolerant, next-generation artificial pancreas (AP) system that will automatically monitor and infuse insulin according to metabolic changes that occur in response to food intake and various types of exercise, from solo fitness efforts to organized sports.

IIT, in collaboration with the University of Chicago, the University of Illinois at Chicago, and York University (Toronto), is refining such a system in a five-year study funded by two grants from the National Institutes of Health supplemented by an additional grant from the Juvenile Diabetes Research Foundation, totaling more than \$5 million. The team is building upon the results of its NIH-funded earlier AP study started in 2009 that showed promising results in a small group of type 1 diabetes subjects.

“We were the first group that supplemented glucose measurement information with a sports armband (BodyMedia Sensewear) that reports a person’s physiological variables, such as energy expenditure through exercise or sweating to build a multivariable AP control system,” says Cinar. “If acceleration remains unchanged but sweating increases, stress unrelated to the activity may be the culprit. That would have a different metabolic chain of events and impact on the glucose utilization than someone who is running five miles.”

Nelson and other participants in the current study spent three days under observation at the University of Chicago Clinical Research Center. For the first 24 hours, they eat meals and exercise and they regulate their own insulin. A continuous glucose monitor and the sports armband collect information on their physiological responses and blood glucose levels. For the last 36 hours, participants again go through a prescribed meal and treadmill exercise regimen attached to two continuous glucose monitors and the armband. The data collected are entered into a computer every 10 minutes and the control algorithm developed at IIT determines the necessary amount of insulin for proper body functioning. In previous trials the recommended insulin dose was assessed by the medical staff and the adjustment of the insulin pump was made upon their approval for patient safety. The adjustments will become fully automated in the new studies to make the artificial pancreas independent of medical personnel decisions.

“This system would revolutionize the lives of our patients...It would change their lives dramatically.” —Elizabeth Littlejohn

“The algorithm basically predicts going forward what the blood sugar will be in the next 30 or 40 minutes and suggests an insulin dose,” says pediatric endocrinologist Elizabeth Littlejohn, associate director of the Kovler Diabetes Center at the University of Chicago, who is responsible for the participants’ safety while they are wearing the apparatus.

“This system would revolutionize the lives of our patients,” Littlejohn says, noting that the team is working with Medtronic, the world’s largest medical technology company, to fit the algorithmic software into a device the size of a cell phone that could be worn like a pager. “They could put on the AP and go about their day; their blood sugars would be managed without the individual being involved. It would change their lives dramatically.”

In fall 2013, the United States Food and Drug Administration approved a very basic AP developed by Medtronic that can stop insulin flow if the glucose level drops below the limit for hypoglycemia. The next generation of APs will have more sophisticated control systems that can regulate insulin infusion rates continuously to keep glucose levels within range and prevent both hyperglycemia (very high glucose levels) and hypoglycemia. While many private and university-based groups are working on this type of AP system, the IIT collaboration is the only one focusing on capturing exercise, stress, and sleep conditions automatically and using them in the controller of the AP, according to Cinar.

Nelson, who rides his bicycle year-round, is hopeful that the team's technologically advanced AP system could one day be of long-term benefit to him as well as many of the other estimated 350 million individuals with diabetes worldwide. Although he maintains a positive attitude, the

AP system would reduce the uncertainty that comes with living with diabetes.

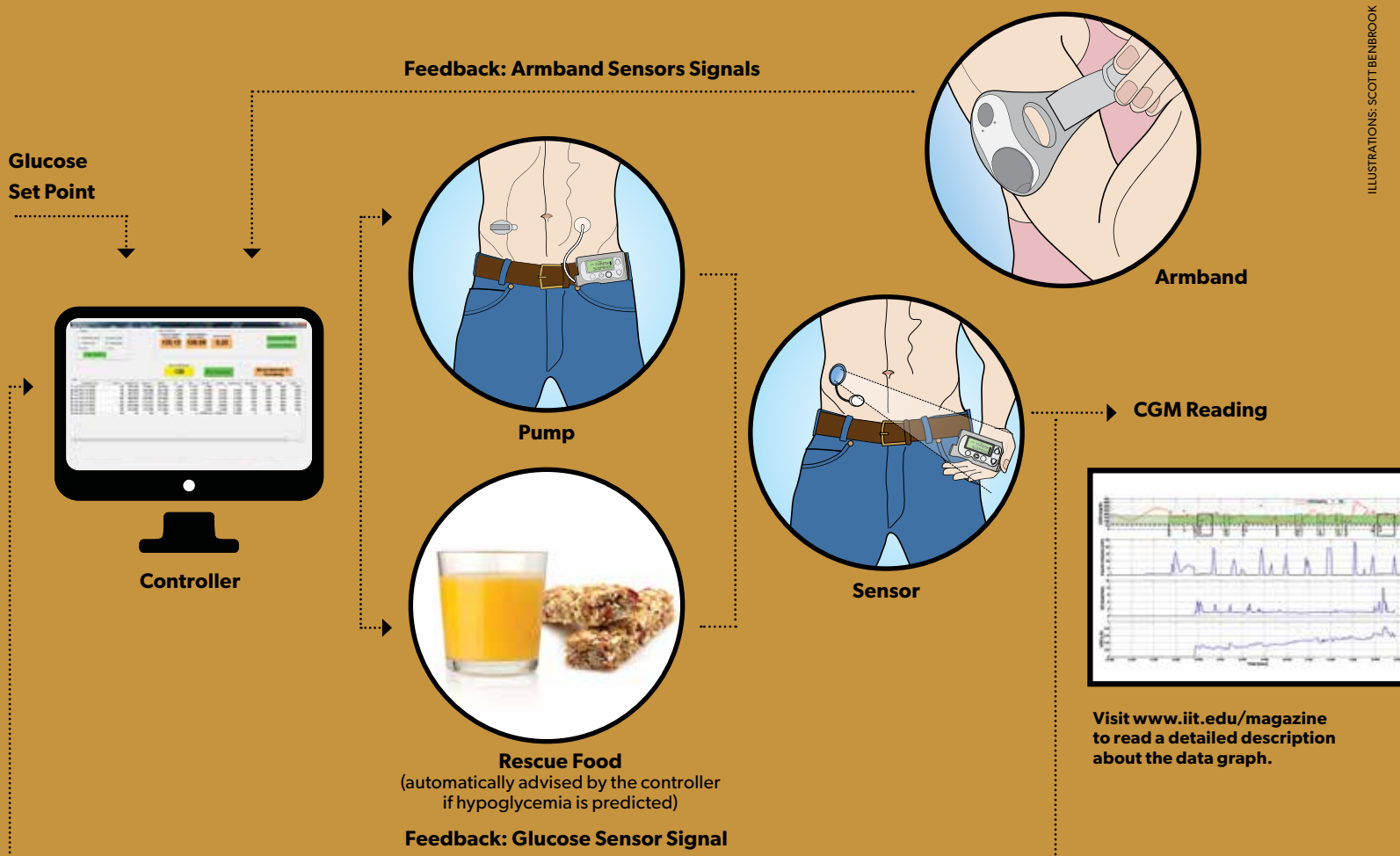
"Living with diabetes isn't the worst thing in the world, but it is an ongoing challenge to level everything out with my daily activities," says Nelson. He knows that his participation in the clinical study is important. "When I first learned I had diabetes, I was depressed. But with the support of family and friends, I have a better attitude and use my diabetes as an advantage to help others." ■

MORE ONLINE

"Multivariable Adaptive Closed-Loop Control of an Artificial Pancreas Without Meal and Activity Announcement": www.ncbi.nlm.nih.gov/pubmed/23544672

"Hypoglycemia Early Alarm Systems Based on Multivariable Models": www.ncbi.nlm.nih.gov/pubmed/24187436

Integrated Multivariable AP



ILLUSTRATIONS: SCOTT BENBROOK

Hypoglycemia, or low blood sugar, is a real concern among diabetics. It occurs when the body's level of insulin is too low and most commonly happens during sleep, when a person has consumed a smaller-than-usual amount of food, or has exercised. Besides taking those situations into account in adjusting the dose of insulin infused, the AP

system being developed would also alert the individual that blood sugar levels are dropping 25 minutes before critical levels have been reached. This will empower patients to take simple countermeasures such as eating snacks or drinking some fruit juice to reverse the trend.

In this diagram, the controller receives feedback information from the glucose and armband sensors, and computes the insulin infusion rate that is transmitted to the pump every 10 minutes. The graph [above right] is part of the data collected during a clinical experiment that lasts about 60 hours; a six-hour segment is shown in the figure.

Range Warrior

Electric vehicles are dramatically changing the way people move from place to place, ushering in an era of cleaner transportation. But according to Carlo Segre, Duchossois Leadership Professor of Physics at Illinois Institute of Technology, there is still one big hitch: the distance such vehicles can travel before needing to be recharged.

Segre says that the more affordable electric vehicles today can travel approximately 100 miles on a single charge, and for some drivers, this presents what he refers to as “range anxiety”—a predicament Segre hopes to address through his research.

In a three-year, \$3.4 million project funded by the United States Department of Energy Advanced Research Projects Agency-Energy (ARPA-E), Segre’s interdisciplinary team, including IIT collaborator John Katsoudas (PHYS ’97, M.S. ’04); Vijay Ramani, Hyosung S. R. Cho Endowed Chair Professor of Chemical Engineering at IIT; and collaborators from Argonne National Laboratory—Elena Timofeeva, Dileep Singh, John Zhang, and Michael Duoba (ME ’91)—will design and construct a new kind of battery for such vehicles.

The range issue, Segre explains, is due to the limited energy per unit volume (or energy density) available in conventional lithium-ion (li-ion) batteries suitable for electric cars.

“If you could increase the energy density by a factor of five, you’ve got a 500-mile range,” he says. “That takes care of a lot of problems.”

The RANGE (Robust Affordable Next Generation EV-Storage) program is ARPA-E’s ambitious funding effort designed to accelerate widespread electric vehicle adoption by dramatically improving their driving range, cost, and reliability. Segre’s proposal involves the design of a prototype EV scalable flow battery that uses high-energy density nanoelectrofuel.

Li-ion batteries currently used in electric vehicles have the advantage of high cell voltage and energy density compared to previous generations of car batteries, but as Segre notes, there have always been drawbacks. In addition to energy-density limitations, there are multiple issues such as thermal runaway, gradual degradation of electrode materials, shortening the battery lifespan, and long charging times.

The group’s new approach has the potential to greatly increase the energy density and lifespan of vehicle batteries, while eliminating the need for lengthy recharging altogether. The trick, Segre explains, is in the battery fuel itself.

“Our idea and patent is to load the electrochemical fluid with nanoparticles that are solid,” says Segre. “The key is

making a stable suspension solution of nanoparticles, which increases the capacity of the fuel to store electrical energy.”

More conventional types of flow batteries have been around for a while, but low energy density limited their use to stationary applications, where the battery fluid can be stored in large tanks—too large to be practical for any vehicle. With the addition of nanoparticles, however, high energy densities can be achieved in a vehicle-ready battery. Perhaps most attractive is the fact that the discharged liquid fuel could potentially be replaced at a filling station in a matter of minutes. Currently, most electric cars must be charged overnight, once their batteries are depleted.

“This idea gets rid of the whole range issue,” Segre says. “If you can refill your battery tank, then it’s just like using normal fossil fuel.” That is, minus the harmful emissions.

Some of Segre’s flow battery investigations involve structural characterization of materials and studies of catalysis events using synchrotron radiation. As director of the Center for Synchrotron Radiation Research and Instrumentation, Segre oversees two ambitious, multi-institute ventures based at IIT: the Materials Research Collaborative Access Team and the Biophysics Collaborative Access Team.

“If you could increase the energy density by a factor of five, you’ve got a 500-mile radius. That takes care of a lot of problems.”—Carlo Segre

The use of synchrotron radiation for battery research has grown exponentially in recent years. Using X-ray spectroscopy, for example, Segre hopes to explore the transport of intercalating ions within the nanoelectrofuel. Segre’s group has worked for the past three years on the technology, overcoming several important technical hurdles.

“One challenge in our project has been to charge and discharge nanoparticles while they are flowing,” he says. “We’ve demonstrated that we can do that with a special kind of electrode that we’ve invented.”

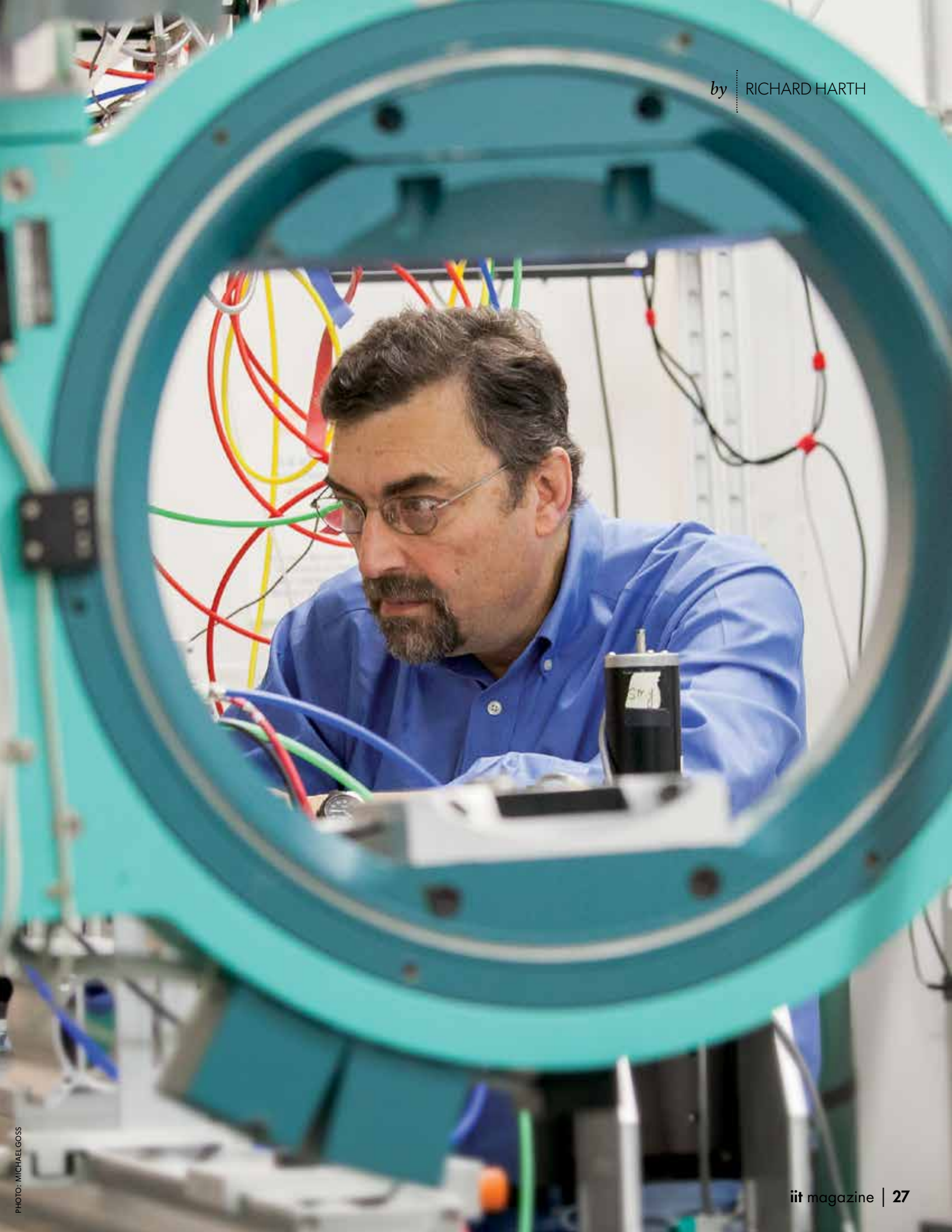
Once a viable prototype can be created, the next step will be to commercialize the technology and ultimately develop a nanoelectrofuel distribution network that may allow for the use of existing fossil-fuel filling stations. ■

MORE  ONLINE

ARPA-E: <http://arpa-e.energy.gov>

Center for Synchrotron Radiation Research and Instrumentation:
<http://iit.edu/csrr/facilities.shtml>

by RICHARD HARTH



by MARCIA FAYE

A woman with short, spiky black hair, wearing glasses and a black blazer, stands in a library with her arms crossed. She is smiling slightly. The background shows a large, modern library with a high, arched ceiling and several study tables with purple chairs. Other people are visible in the background, some sitting at tables. The lighting is warm and focused on the woman.

A VOICE FOR JUSTICE IN SOUTH AFRICA

In the South African township of Evaton, a Zulu woman exits the dilapidated shack where she lives with several members of her family and walks a short distance to a plot bearing a solitary, off-white tombstone, where she talks to the spirit of her father, Wine Ndolila.

“We are here about your land that was taken during apartheid,” Ntombena Ndolila says in her native language while kneeling on all fours on the ground near the memorial. “As your daughters, we have all the rights. This is our father’s land. Halala Ndolila, your land is coming back.”

The Ndolilas are so confident that their country’s government will return their ancestral land to them that they have chosen to live there as squatters, even after the apartheid government bulldozed their homes and twice evicted them from the property. The family’s tenacity seized the attention of Bernadette Atuahene, associate professor at IIT Chicago-Kent College of Law, who has focused on their plight in *Sifuna Okwethu*, Zulu for *We Want What’s Ours*, an award-winning documentary she produced and directed on the subject of land restitution in South Africa. The Ndolilas provide a face for a cause Atuahene has embraced since 2002 when she did a clerkship at the South African Constitutional Court as a Fulbright Scholar.

“The dire inequality in Johannesburg was so striking to me,” says Atuahene, a Los Angeles native whose parents are from Ghana. “I’d never seen so many Lamborghinis, Lotuses, and other exotic cars next to such extreme poverty. I knew that part of what was contributing to this inequality was land theft—where the reigning white regimes replaced an inheritance of wealth with an inheritance of disadvantage. Due to colonial and apartheid-era land theft, in 1994, whites owned 87 percent of the land in South Africa, although they constituted less than 10 percent of the population. Nearly 20 years later, only 8 percent of the land has changed hands from whites to blacks. I knew that this was my issue; it just boiled my blood and I had to do something about it.”

The passage of the Natives Land Act of 1913, colonialism, and especially apartheid—a form of racial segregation enforced in South Africa from 1948–94 by the ruling National Party government—gave rise to land theft as tens of thousands of the African majority were forced to move to assigned areas, many losing their ancestral land without compensation. Apartheid was recognized as coming to an end with the 1994 democratic general elections in which the late Nelson Mandela was named president. A Land Restitution Program was initiated to provide compensation to Africans who lost their property after 1913. Atuahene says the huge undertaking has been slow-moving and far from perfect, resulting in only approximately 80,000 individuals filing claims.

The program has encountered an additional problem—as in the case of the Ndolilas—that is not simply black and white.

During apartheid, working-class black Africans purchased parcels of land taken from poor families such as the Ndolilas and built homes on them without knowledge of the underlying land claim situation. With their deep reverence for their ancestors, the Ndolilas do not want to be relocated to another area. They also do not want monetary compensation for the land.

“One of the things that most hurt my heart was when I heard people say they were treated just like they were during apartheid,” says Atuahene, referring to the restitution process. She returned to South Africa in 2008 to interview 150 land claimants who had already received some measure of government restitution. The interviews comprise Atuahene’s book *We Want What’s Ours: Learning from Land Restitution in South Africa* (Oxford University Press), which will be available in the United States in May. Atuahene has been funded by a private German foundation to go on a South African book tour this year to coincide with the twentieth anniversary of South African democracy and she continues to research ways to chip away at the inequality.

“As your daughters, we have all the rights. This is our father’s land. Halala Ndolila, your land is coming back.”

—Ntombena Ndolila



Ntombena Ndolila communes with her father, Wine, at his memorial in South Africa.

She formed the nonprofit Documentaries to Inspire Social Change with all proceeds from the sale of *Sifuna Okwethu* going toward film distribution and curriculum development for a companion course for secondary-school students in the U.S. and South Africa. She has also offered her services as a consultant to the South African Commission of Restitution of Land Rights, which has plans to reopen the claim-filing process this year to allow more individuals to file for restitution.

Atuahene says that the international community united to help bring apartheid to an end. She is hopeful that this same spirit of unification will prevail as more individuals realize that justice still eludes many in South Africa.

“All of us who came together to kill apartheid need to once again join hands to kill the legacy of apartheid—land dispossession,” she says. ■

MORE ONLINE

Documentaries to Inspire Social Change: <http://discwebsite.org>

“South Africa’s Land Reform Crisis: Eliminating the Legacy of Apartheid”:

www.foreignaffairs.com/articles/67905/bernadette-atuahene/south-africas-land-reform-crisis



classnotes

1950s

Morley Simon (ARCH '55), El Macero, Calif., and his wife visited IIT Main Campus in fall 2013 for the first time in 20 years. His graduating class was the last class prior to the construction of S. R. Crown Hall. Simon is employed as a consulting architect.

William Warke (MET '59, Ph.D. '69), Palos Hills, Ill., received the Founding Committee Award from ASTM International Committee A01 on Steel, Stainless Steel and Related Alloys in recognition of his high level of leadership and exemplary contributions to the development of ASTM steel standards. He was a research associate at Amoco Corporation for nearly 20 years before retiring in 1997.

1960s

Norbert Pointner (ARCH '61, M.S. CRP '62), Wheaton, Ill., a semi-retired architect and city planner, is a contributing editor at the *Journal of City Development*. He has also published papers in various professional newsletters and magazines.

Duane Anderson (ARCH '62), Summerfield, Fla., who worked with Ludwig Mies van der Rohe from 1961–69, and Anderson's firm, Anderson Architects, specializes in designing Lutheran churches. Anderson says the firm has completed 110 churches, as well as nine schools.

Ray VanHorn (IE '62), Annapolis, Md., and his wife celebrated their 50th wedding anniversary on July 19, 2013.

1970s

Manu Vora (M.S. CHE '70, Ph.D. '75), Naperville, Ill., had the article "Life-Long Volunteerism" published in the January 2014 edition of the American Society for Quality magazine *Quality Progress*. Also in January, Vora delivered the Indian Institute of Technology-Banaras Hindu

University Institute Lecture on "Sustainable Change Management for Excellence" in Varanasi, India.

1980s

Herman Brewer (CRP '81), Chicago, is chief of the Cook County Bureau of Economic Development.

Mathai Varghese (MATH '81), Adelaide, Australia, has been appointed to the Elder Chair of Mathematics at the University of Adelaide. The Elder Chair in Mathematics is one of the original titles given at the university, which was founded in 1875.

David Mok (ME '86), Morgan Hill, Calif., is worldwide director of pricing for DePuy Synthes Spine, a Johnson & Johnson company.

Delores Robinson (LAW '86), Chicago, is president of the Cook County Bar Association, leading the organization into its 100th year. A longtime bar association leader, Robinson is a private-law practitioner in the areas of employment discrimination, residential and commercial real estate transactions, and business law, concentrating on small businesses. She is also an arbitrator with the Cook County Mandatory Arbitration Program.

Ian Blum (EE '87), New Rochelle, N.Y., was elected to membership at the law firm of Cozen O'Connor in March 2013. His practice includes all aspects of intellectual property including patent, trademark, copyright, and computer law, with a focus on the procurement and enforcement of intellectual property rights.

Timothy Koschmann (Ph.D. CS '87), Springfield, Ill., professor of medical education at Southern Illinois University School of Medicine, received an honorary doctorate from the University of Gothenburg in Sweden. He was honored for his work in collaborative instruction and the social



Arun Prakash (AE '99), Austin, Texas, partner at Virgo Capital, climbed Colorado's Mount Princeton (14,197 feet above sea level) along with Andy Bilhorn (ARCE '00), Chicago; Jon Bortle (EE '00), Fort Walton Beach, Fla.; Mitch Mabrey (ME '00), Dulles, Va.; Chetan Pungoti (CS '00), Seattle; Alex Rasmussen (EE '00), Royal Oak, Mich.; Nicolas Anderson (ARCH '01), Chicago; and Tim Jacobson (ARCH '01), Chicago.

organization of learning. Koschmann established the Collaboration and Learning Laboratory, a forum for the study of student and instructor interaction that uses recordings from mock clinical examinations and actual hospital operating room settings to analyze communication and instruction. He has made this video library available to scholars and researchers around the world.

Gregory Lupia (ME '88), Downers Grove, Ill., is a program engineer with Exelon Generation.

Steven Wade (ME '88, M.A.S. MME '04), River Forest, Ill., is a staff engineer with USG Corporation.

Kem Chong (ME '89, M.S. FMT '95), Chicago, is president and chief executive officer of Boca Global Investments and CHONG Capital Management.

Andrew M. Freborg (MET '89), Stow, Ohio, received a Master of Science in Mechanical Engineering from the University of Akron in August 2013.

1990s

Junjian Tang (M. Arch '93), Lisle, Ill., was appointed chair of the new Architectural Practice Committee of the Society of American Military Engineers.

Ewan Duncan (M.Des. '94), Seattle, a principal at McKinsey & Company, co-authored "The Truth About Customer Experience," which appeared in the September 2013 issue of the *Harvard Business Review*.

Judson Althoff (ME '95), Palo Alto, Calif., is president of sales and marketing for Microsoft North America.

Diane Jacobsen (M.Des. '98), Seattle, led a project at the Toyota Motor Corporation that is featured in the book *Solving Problems With Design Thinking: Ten Stories of What Works*.

Tania Schlatter (M.Des. '99), Brookline, Mass., co-authored the book *Visual Usability: Principles and Practices for Designing Digital Applications*. She continues to practice design in the Boston area as co-founder of Nimble Partners and teaches courses in design at Northeastern University.

2000s

Andrew Rubin (Ph.D. PSYC '01), Pompano Beach, Fla., was appointed by Governor Rick Scott of Florida to the State Board of Psychology for a three-year term.

Lina Nilsson (CHE '02), Berkeley, Calif., is one of 10 women selected for the "35 Innovators Under 35" for 2013 by *MIT Technology Review*. Innovation director for the Blum Center for Developing Economies at the University of California, Berkeley, she is helping to create a new field of study for leveraging technology in international development—development engineering—with the United States Agency for International Development. Nilsson was also recognized for her work as founder of Tekla Labs, a global technology cooperative that designs, catalogs, builds, and uses do-it-yourself laboratory equipment. During fall 2013, the company ran a national Build My Lab equipment-design competition, which was open to IIT students.

Brianna Sylver (M.Des. '03), Evanston, Ill., and her husband, **Adriano Galvao** (M.Des. '02, Ph.D. '06), co-owners of the research company Sylver Consulting, recently partnered with the user-experience research team of Mozilla Firefox to design a new mobile phone for the middle class of Latin America. Sylver Consulting conducted several research projects in Latin America whose results had a direct impact on the development of the phone.

Jay Yusko (Ph.D. CS '05), Lombard, Ill., is vice president of Technology Research.

Zachary Jean Paradis (M.D.S. '07), Chicago, and **David McGaw** (M.D.S. '07), Berkeley, Calif., co-authors of the book *Naked Innovation*, coordinated a crowdsourced critique project to help them finalize an updated version of the book.



Elizabeth Bilitz Shelley (MSE '07, M.S. '09), Chicago, and **Mark Bilitz** (DSGN '79), Plymouth, Minn., took time for a father-daughter photo during Bilitz Shelley's August 2013 wedding.

Naomi Calmatuianu (CE '08), Chicago, was named Outstanding Project Manager 2012-13 by the Association of Subcontractors & Affiliates of Chicago.

Raymond Ballard (CHE '10), Park Ridge, Ill., is a technical advisor at UOP LLC, a Honeywell company.

Joshua Bradley (CE '11, M.A.S. CM '13), Chicago, is a civil estimator at DeNovo Constructors Inc.

Jason Wilson (M.S. EMS '11), Bolingbrook, Ill., is lead environmental health and safety coordinator at the McLaughlin Body Company.

Douglas Hsu (M.D.M. DSGN '12), Taipei, Taiwan, is chief innovation officer of the Far Eastern Group.

Tuduyen Nguyen (M.Des. '12), Chicago, was one of six winners in a design competition that visualized ways to prevent deliberate mass violence against civilians. She developed Thread, a platform that would leverage existing programs and technology to piece together information from different places and connect it to appropriate people and organizations to take action. The competition was coordinated by the United States Agency for International Development, Humanity United, and OpenIDEO.

Emmanuel Klu (CS '13), Santa Clara, Calif., is a software engineer at Google Inc.

ALUMNI EVENTS

For information about the upcoming alumni events listed here and other alumni activities, please contact the Office of Alumni Relations at alumni@iit.edu, alumni.iit.edu, or 312.567.5040.



FUELING INNOVATION— IGNITING THE NEXT GENERATION OF IIT INNOVATORS

Thursday, March 20, 2014
Headquarters of Prysm, Inc.
San Jose, Calif.

Join us for an event hosted by Praveen Gupta (M.S. EE '89) to hear about the university's exciting plans to build an Innovation Center for the next generation of trailblazers.

MIES' BIRTHDAY CELEBRATION

Thursday, March 27, 2014
S. R. Crown Hall
IIT Main Campus
Chicago

Celebrate Ludwig Mies van der Rohe at the annual birthday party hosted by the Mies van der Rohe Society. Tickets are \$50 per person. For more information contact Elisabeth Dunbar at 312.567.5082 or miesmembership@iit.edu.

CAMRAS BOWL 2014

Saturday, March 29, 2014
Stuart Building
IIT Main Campus
Chicago

Test your trivia knowledge! Assemble an alumni team or watch alumni and student teams compete in Camras Bowl 2014.

FUELING INNOVATION— INTERDISCIPLINARY STUDENT PROJECT SHOWCASE

Monday, April 7, 2014
Daniel F. and Ada L. Rice Campus
Wheaton, Ill.

Join us for an event featuring the Interprofessional Projects (IPRO) Program and the student masterminds behind some of the most creative projects at IIT.

SOUTH SIDE BASEBALL CLASSIC

Saturday, May 3, 2014
U.S. Cellular Field
Chicago

Join us for the Southside Classic as the Illinois Tech Scarlet Hawks take on Maranatha Baptist Bible College at 1 p.m.

ALUMNI AWARDS

Friday, April 25, 2014
Hermann Hall
IIT Main Campus
Chicago

Join IIT Alumni Association members in celebrating the accomplishments of our distinguished alumni. The day will begin with a reception at 11 a.m. followed by a formal luncheon and awards presentation. Tickets are \$50 per person.

SCARLET HAWK SEND OFF!

Thursday, May 15, 2014
The Bog, Hermann Hall
IIT Main Campus
Chicago

Join us for food, drinks, and camaraderie as we congratulate the IIT Class of 2014 and welcome them into the Alumni Association.

COMMENCEMENT

Saturday, May 17, 2014
IIT Main Campus
Chicago



1



2

1. Red Carpet Celebrants [Left to right] Suzie Wendorf, former Chairman of the IIT Board of Trustees John Rowe, and Mayari Pritzker (Ph.D. PSYC '01) joined current Chairman of the IIT Board of Trustees Alan "Bud" Wendorf (ME '71) on the red carpet at the 2013 Henry Townley Heald Award dinner honoring John Rowe. *Photo: Michael Goss Photography*

2. Space Panel [Left to right] NASA employees Brandon Lloyd (AE '08), Russell Derrick (BME '06), Elena Buhay (CPE '12), and Rudy Balcunas (MAE '80) shared their views on space exploration at the Houston alumni event, held in November 2013. *Photo: Steve Lee Photography*

3. School Spirit IIT President John Anderson and alumni show their school spirit in California for the Caltech vs. Illinois Tech men's basketball game.



3



4



5



6. Golden Medallion IIT President John Anderson [right] and Trustee John Olin (ME '61) present Werner Frank (MATH '51) [center] with his Golden Society medallion at a pep rally before the Caltech vs. Illinois Tech basketball game.

7. Austin Cooking Demo Alumni observe a cooking demonstration at the Whole Foods Market in Austin, Texas.

8. 1871 Gathering Entrepreneurship panelist Hazem Dawani (CPE '01) talks with fellow alumni at a gathering of Chicago-area alumni and friends at 1871. *Photo: Bonnie Robinson Photography*



4. 1776 Incubator Alumni enjoyed an evening with Alan Cramb, IIT provost and senior vice president for academic affairs, at the Washington, D.C., startup incubator 1776. *Photo: Chris Stump Wedding and Event Photography*

5. Scottsdale Art Speaker Peter Koliopoulos (ARCH '86) [left] and Alan Cramb, IIT provost and senior vice president for academic affairs, at the alumni gathering at the Scottsdale Museum of Contemporary Art in Arizona. *Photo: Tim Trumble Photography*

9. Gunsaulus Society Luncheon Alumni members of the Gunsaulus Society enjoy a special luncheon in Sherman Oaks, Calif. *Photo: South Bay Studio*

10. Darsh T. Wasan Lecture After delivering the 2013 Darsh T. Wasan Lecture, R. K. Pachauri, director general of The Energy and Resources Institute (New Delhi, India) [center], meets with IIT President John Anderson and IIT Vice President for International Affairs Darsh T. Wasan [left]. *Photo: Bonnie Robinson Photography*

Giving Back Is the Right Thing to Do



Maurice Watkins (MET '68, Ph.D. '73) likes to quote a line from his dad's favorite gospel song, performed by Mahalia Jackson: *"If I can help somebody as I travel along, then my living will not be in vain."*

Born and raised in East Chicago, Watkins recalls that his father never let his limited financial resources prohibit his ability to help someone in need.

"That was the environment I grew up in," he says, "and I endeavor to continue my father's legacy."

Watkins and his wife, Joyce, have established a scholarship that provides financial assistance to deserving Chicago Public Schools students through the Collens Scholarship Program, and they are also endowing it in their estate plan. Watkins credits his IIT education for his long and rewarding career as a technical advisor at ExxonMobil.

"I was better prepared than my industry peers to do research, thanks to IIT. I had the most fun while learning to think critically and focusing on fundamental science. Graduate school was the best time of my life."

"As a student, I received scholarships and a graduate school fellowship. When I was made aware of the scholarship needs for current students, I wanted to help. Why not do something while I can see the benefits?"

— MAURICE WATKINS (MET '68, PH.D. '73)

BENEFITS OF A BEQUEST

- Help ensure IIT's future
- Leave a legacy of giving back
- Give without affecting your current cash flow
- Retain control of your assets during your lifetime
- Direct your gift to a particular purpose (be sure to check with us to make sure the gift can be used as intended)

Visit www.iit.edu/giftplanning to begin learning about how you can benefit from these giving methods and more. Contact Stuart Gold, director of gift planning, at giftplanning@iit.edu or 312.567.5020.

If you have named IIT as a beneficiary of your planned gift, such as a bequest, please let us know so we may acknowledge your generosity and include you as a member of our esteemed Gunsaulus Society.

Gunsaulus | SOCIETY

obituaries

Robert Bonthron (ME '44, M.S. '52, Ph.D. '62)

IIT Armour College of Engineering
Professor Emeritus

Two years after receiving his bachelor's degree, Robert Bonthron embarked on a nearly half-century academic career at IIT. He taught in the Department of Mechanical, Materials, and Aerospace Engineering and also served the university as dean of students. In addition to being a gifted teacher, Bonthron inspired students, staff, and faculty alike with his warm personality and sense of humor. Bonthron was also then IIT patriarch of his family with four other members also attaining university degrees: brother John Bonthron (IE '51), sons Scott Bonthron (ME '88, M.B.A. '94) and Brett Bonthron (EE '88), and nephew Douglas Bonthron (ME '79).

In addition to his sons, brother, and nephew, Bonthron is survived by his wife, Dorothy, and other family members, including several grandchildren.

Lois Graham (M.S. ME '49, Ph.D. '59)

IIT Armour College of Engineering
Professor Emerita

A pioneer in the field of mechanical engineering, Lois Graham was one of the first women to attain a bachelor's degree in the discipline (1945) from Rensselaer Polytechnic Institute. She continued her string of "firsts" at IIT, where she was the first female graduate student in the Department of Mechanical, Materials, and Aerospace Engineering. The same year that Graham earned her master's degree, she became the first female MMAE faculty member and remained on faculty until her retirement in 1985. Graham was also the first woman in the United States to earn a doctorate in mechanical engineering and the first to achieve fellowship in the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (now ASHRAE). Passionate about increasing the number of women in engineering, Graham founded and directed IIT's Women in Science and Engineering Program. She also led efforts to introduce engineering to underrepresented groups through the Minorities in Engineering Program at IIT.

Graham is survived by several family members, including her brother, Paul, two stepsons, a niece, two nephews, and several grandchildren.

Editor's Note: Lois Graham was profiled in the fall 2009 issue of IIT Magazine, which can be found at www.iit.edu/magazine/fall_2009/pdfs/Alumni_News_Fall09Mag.pdf.

Spencer Smith

IIT Armour College of Engineering
Professor Emeritus

A member of the IIT faculty for more than 30 years, Spencer Smith was also chair of the Department of Industrial and Systems Engineering (now the Department of Mechanical, Materials, and Aerospace Engineering). In the public sector, his career included work at Montgomery Ward, the Raytheon Company, and the Mergenthaler Linotype Company. Consulting clients included the United Nations; Sears, Roebuck and Co.; Standard Oil; and McDonald's.

Smith was preceded in death by his wife, Mildred, who was known as "Millie."

inmemoriam

Rodger Knaus

EE '36
Lake Hamilton, Fla.

Henry Hart

M.S. EE '41
Highland Park, Ill.

Richard L. Hanneman

ME '42
Fredericksburg, Texas

Theodore Meinhold

CHE '43
Wauconda, Ill.

Howard Kehrl

ME '44
Rancho Palos Verdes, Calif.

Martin Mazurk

ME '48
Elmhurst, Ill.

Robert Robertson

IE '50
Naperville, Ill.

William Ruzgis

PHYS '53
Dorr, Mich.

Lyle Pellock

EE '56
Garland, Texas

James Tudor

Ph.D. EE '60
Hallsville, Mo.

Richard C. Dean

BE '62
St. Louis, Mo.

Arthur Abrassart

ME '63
Corvallis, Ore.

Jonas Martinkus

EE '63
St. Charles, Ill.

Raymond Springer

MET '63
New Lenox, Ill.

Maria Koter

ARCH '81
San Diego

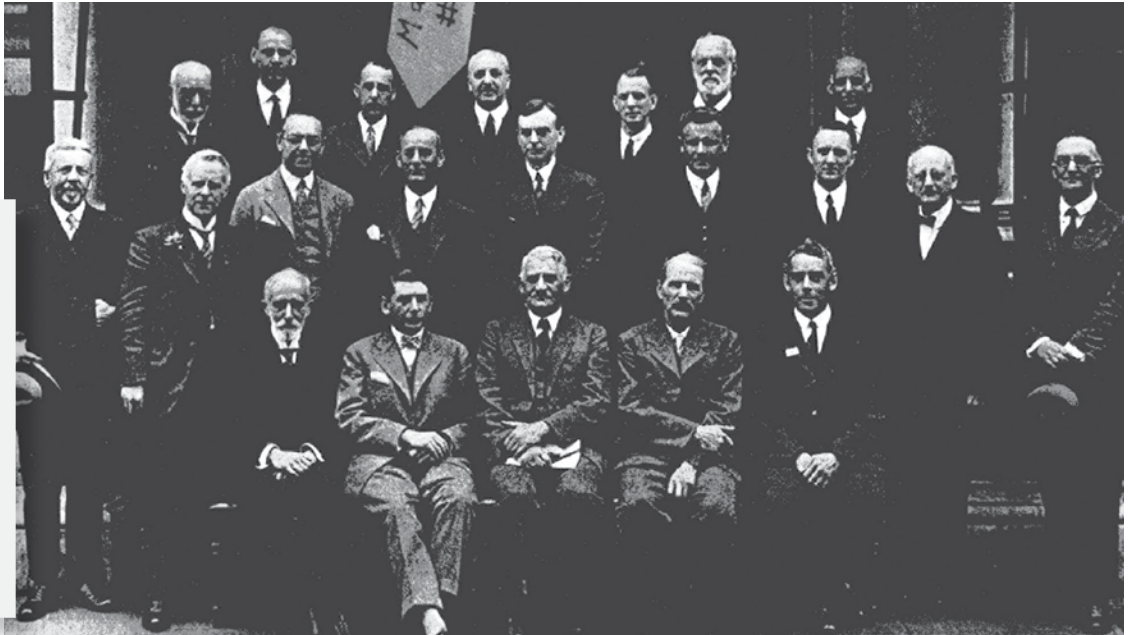
Teshima Walker

M.P.A. '96
Chicago

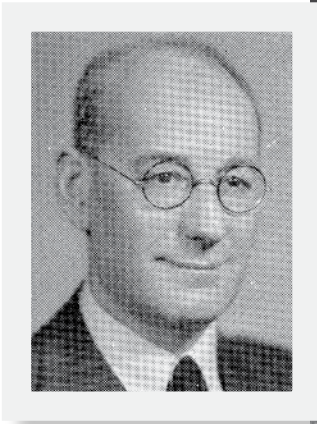


Elizabeth Wright Ingraham (ARCH '41), [bottom row, left] San Antonio, Texas, passed away in September 2013. An acclaimed architect in Colorado Springs, Colo., where she designed nearly 150 buildings, she was the granddaughter of Frank Lloyd Wright. *Photo: IIT Archives (Chicago)*

Max Jakob [indicated by arrow] joins other delegates at the First International Steam-Table Conference, held in London in 1929.



SOURCE: IIT ARCHIVES (CHICAGO)



Physicist Max Jakob: Eminent Immigrant Research Scientist

“[Max] Jakob’s coming to America was terribly important for us. We were far behind Germany in understanding heat flow, and we were working hard to make up ground. Jakob gave us our first direct conduit to that knowledge...With Max Jakob showing the way, heat flow expertise passed to America.”¹

Max Jakob (1879–1955) was a faculty member in the Department of Mechanical Engineering at Armour Institute of Technology (AIT), a predecessor of IIT, and a research scientist at Armour Research Foundation, a forerunner of IIT Research Institute. Jakob was one of the many eminent German scientists to immigrate to America rather than work under Adolph Hitler’s regime. In 1936, Jakob was actively recruited by AIT President W. E. Hotchkiss to join Armour Research Foundation. A heat laboratory was created specifically for Jakob after his arrival.

Jakob was recognized as one of the “four or five leading scholars of the world in his field” who probably could have found an appointment to any of several universities or businesses in the United States. Reportedly wooed to AIT by his friend and colleague Enrico Fermi, Jakob was 58 years old when he arrived here, having left behind a 30-year career in his native country to begin what would become a 20-year career in his adopted country. As a result, the free world was able to take advantage of science knowledge born of a brilliant mind and a compassionate heart. Jakob continued to do

research at IIT until his death. He was installed in the IIT Hall of Fame in 2002.

Jakob is an individual whose impact on his discipline should be rediscovered and re-evaluated in light of the political power shift from Europe to the U.S. after World War II. He may never have been a household name, but the hundreds of books, articles, and journals that he wrote or edited attest to his preeminence in his chosen research field. Today, the scientific literature continues to cite Jakob’s pioneering research on heat transfer and fluid flow. The fundamental principles he derived found applications in the nuclear, electronics, and aerospace industries.

Jakob and IIT worked well together, each contributing to the other’s success. Jakob was given the opportunity to research and publish under the auspices of the university; likewise, IIT could take credit for employing one of the most influential and inspired thinkers in the field of heat transfer. The IIT Archives is proud to hold a small collection of materials related to Max Jakob.²

¹ John H. Lienhard, *Engines of Our Ingenuity*, “No. 1546: Max Jakob,” www.uh.edu/engines/epi1546.htm July 6, 2001, ©1988–2000 by John H. Lienhard.

² To see a digital exhibit about Max Jakob, please contact IIT Archives at bruck@iit.edu. The exhibit will be sent to you as a PowerPoint file.

Fueling Innovations in Research

The keys to safer and earlier detection of a range of diseases like diabetes, Alzheimer's, and cancer could lie in pictures.

A team of researchers led by Miles Wernick, Motorola Endowed Chair in Engineering and director of IIT's Medical Imaging Research Center at the Pritzker Institute of Biomedical Science and Engineering, are conceiving new imaging devices, procedures, and approaches that are making X-rays a thing of the past. Wernick and his colleagues are researching high-resolution images that could lead to safer and more accurate detection of many diseases, including prostate and breast cancers, cardiac conditions, and traumatic brain injury.

IIT faculty and students are engaged in cutting-edge research that can change our world in ways beyond imagination. *Fueling Innovation: The Campaign for IIT*—the university's six-year, \$250 million fundraising campaign—is providing the necessary support and infrastructure for students and faculty to conduct these scientific explorations, propelling IIT into the top tier of the world's technology-focused, innovation-centered universities.

Visit fuelinginnovation.iit.edu for stories of innovators like Wernick and to learn more about the campaign.

Tell us your innovation story!

We want to know how you are affecting change in your communities, regions, and nations. Email us at innovation@iit.edu along with your name, class, and major.

fuelinginnovation
THE CAMPAIGN FOR IIT

DON'T MISS OUT!

IIT Global Alumni Gathering, Chicago September 19–21, 2014



GLOBAL ALUMNI GATHERING

ILLINOIS INSTITUTE OF TECHNOLOGY

Come back to Main Campus and connect with the IIT community—alumni, faculty, students, innovators, and entrepreneurs—as we celebrate our imprint on innovation!

This three-day program will be focused on the university's niche areas, fostering innovation and entrepreneurship, energy, intellectual property, and capital markets.

Speakers

Parth Amin (BA '85): Founder, Chairman, Managing Director, and CEO, SLK Software Services—India

Hazem Dawani (CPE '01): Co-Founder and CEO, OptionsCity Software, Inc.—United States

David Hansen (LAW '84): Partner, Skadden, Arps, Slate, Meagher & Flom LLP & Affiliates—United States

Praful Kulkarni (M.S. ARCH '76): President and CEO, gkkworks—United States

Dhongchai Lamsam (M.S. IE '70): President, Loxley Public Company, Ltd.—Thailand

Victor Lo (DSGN '73): CEO, Gold Peak Industries—Hong Kong

James McMahon (MET '81): Quality Systems Manager, Abbott Vascular—United States

Jeremy Noe (LAW '00): Partner, McDonnell Boehnen Hulbert & Berghoff LLP—United States

Cynthia "C. J." Warner (M.B.A. '87): President, CEO, and Chairman, Sapphire Energy, Inc.—United States

Plan to be in Chicago to network and learn!

Visit alumni.iit.edu/global-gathering for more information about the event, including programs, speakers, and registration.