



Volume 51 – Number 30
Wednesday, June 13, 2007

MIT demos wireless power transmission

Research could free cell phones, portable electronics from wired recharging

Franklin Hadley

MIT Institute for Soldier Nanotechnologies

Imagine a future when cell phones, household robots, laptop computers and other portable electronics recharge themselves wirelessly, free from today's ubiquitous power cord.

Last year MIT physicists presented one theoretical approach to such a future. Now

they have demonstrated it, lighting a 60-watt light bulb from a power source seven feet (more than two meters) away.

The researchers say that their concept, which they refer to as WiTricity (as in wireless electricity), could lead to reduced reliance on batteries in some electronic devices. For example, a laptop in a room equipped with such a wireless power system could run without a battery.

The work was reported in the June

7 issue of Science Express, the advance online publication of the journal Science.

It is led by Assistant Professor Marin Soljacic of the Department of Physics with colleagues from the same department and the Department of Electrical Engineering and Computer Science (EECS) through the Institute for Soldier Nanotechnologies (ISN). They are graduate students Andre Kurs (physics) and Aristeidis Karalis (EECS); Robert Moffatt, a junior in physics;

Professor Peter Fisher of physics; and John Joannopoulos, the Francis Wright Davis Professor of Physics and director of the ISN.

The story begins one late night a few years ago, with Soljacic (pronounced Soul-ya-cheech) standing in his pajamas, staring at his cell phone on the kitchen

See **WIRELESS**

Page 8

Scientists create embryonic stem cells without destroying embryos

David Cameron

Whitehead Institute

Scientists have created embryonic stem cells in mice without destroying embryos in the process, potentially removing the major controversy over work in this field. Embryonic stem cells are special because they are pluripotent, meaning they can develop into virtually any kind of tissue type. They therefore offer the promise of customized cells for therapy.



PHOTO / SAM OGDEN

The work, which appears in the June 6 online issue of Nature, was led by Rudolf Jaenisch, a member of the Whitehead Institute and a professor of biology at MIT.

"Therapeutic cloning" offers the hope of one day creating customized embryonic stem cells with a patient's own DNA. Here, an individual's DNA would be placed into an egg,

resulting in a blastocyst that houses a supply of stem cells. But to access these cells, researchers must destroy a viable embryo.

Now, Jaenisch and colleagues have demonstrated that embryonic stem cells can be created without eggs. By

See **STEM CELLS**

Page 6

Institute graduates Class of 2007

Deborah Halber

News Office Correspondent



PHOTO / L. BARRY HETHERINGTON

A triumphant Sabrina Chang holds aloft her diploma at MIT's Commencement on June 8. She received the S.M. in engineering systems and an M.B.A.

Today's graduates live in a world where the challenges are more complex and global than they were in the 1950s, but they should maintain a '50s sense of optimism, said MIT President Emeritus Charles M. Vest in the main address for MIT's 141st Commencement exercises. Today's graduates should have confidence, he said, that an MIT education has afforded them the knowledge and skills to "make the world well."

During the sun-drenched ceremony, 2,110 undergraduates and graduate students received 1,068 bachelor's degrees, 1,000 master's degrees, 282 doctorates and 10 engineer's degrees.

MIT's extraordinary faculty, Vest said, has given "you and me the opportunity to literally change the world."

Vest said that the rate of technological progress is accelerating every year. While it took 55 years and 35 years, respectively, for the automobile and the telephone to be within the reach of most Americans, the Web took only seven years.

"We'd better get used to it. Three thousand new books are published each day. And the amount of technical information is doubling every two years," he said.

Advances in understanding the human brain, in biological engineering and in genomic medicine bring great benefits, but also great challenges, he said.

"Will these new capabilities of information science, life science, engineering and their combination be used for good or ill? How will you grapple with the ethical and legal questions that will come along with these new pow-

See **COMMENCEMENT**

Page 4

Eppinger is MIT Sloan interim dean; deputy deans appointed

In a pair of announcements Tuesday, June 12, Steven D. Eppinger was named the interim dean of the MIT Sloan School of Management and Professors JoAnne Yates and S.P. Kothari were named as the school's interim deputy deans. Additionally, Professors Roberto Fernandez and Robert S. Pindyck will serve as the heads of the school's behavior and policy sciences and economics, finance and accounting areas, respectively, for the coming academic year. All five appointments are effective July 1.

In an announcement to MIT faculty and staff, Provost L. Rafael Reif noted that

as interim dean, Eppinger, currently one of the school's two deputy deans, would "ensure continued strong leadership during this exciting period in the School's development." Eppinger, whom Reif called "respected for both intellectual and administrative leadership," is the General Motors Leaders for Manufacturing Professor of Management and served as faculty co-director of the Leaders for Manufacturing and System Design and Management Programs from 2001 to 2003 and as co-directive

See **DEANS**

Page 6

Lerman is new dean for graduate students

Chancellor Phillip L. Clay announced the appointment of Steven R. Lerman, the Class of 1922 Distinguished Professor of Civil and Environmental Engineering and current chair of the MIT Faculty, as the Institute's next dean for graduate students, effective July 1.



Steven R. Lerman

Writing to graduate students, faculty and staff on Monday, June 11, Clay noted that Lerman would bring to

his new role "both exceptional knowledge of MIT and deep understanding of the full range of issues in graduate education. His experience and passion will be critical as we develop new ways to provide a richer and more supportive environment for our graduate student community."

Lerman himself said, "I am truly excited about the prospect of working within the MIT administration on issues of graduate education and research. The work that Ike Colbert has done in creating a strong sense of graduate community has been truly extraordinary, and I hope to build on his great accomplishments." He and his wife, Lori Lerman, have served as house-

See **LERMAN**

Page 6

NEWS

GIFTS THAT KEEP GIVING

MIT reunion classes increase giving by \$7 million.

Page 2

FACULTY PROMOTED

The Executive Committee approves faculty promotions.

Page 2

NEWS

CORPORATION ELECTIONS

The MIT Corporation elected eight term members and two life members.

Page 7

ASSOCIATE DEAN OF SCIENCE APPOINTED

Biologist Hazel Sive assumes leadership role July 1.

Page 8

COMMENCEMENT

HOOD-FEST

New Ph.D.s celebrate scholarship, family.

Page 3

A VISION FOR YOU

Hockfield challenges MIT graduates.

Page 5



PHOTO / L. BARRY HETHERINGTON

Martin Tang, president of the MIT Alumni Association, served as chief marshal for the Commencement procession.



PHOTO / DONNA COVENEY

MIT President Susan Hockfield with Charles Vest, center, and Paul Gray, right, both presidents emeritus.

Reunion classes increase giving by \$7M

Nancy DuVergne Smith
MIT Alumni Association

From Tech Night at the Pops to families merrily competing during Tech Challenge games, more than 3,200 alumni and guests gathered last weekend to renew their MIT connections. They also honored this lifelong tie to the Institute as they announced class giving results at the annual Tech Day luncheon at the Johnson Athletic Center June 9. In all, the classes from 1922 through 2007 donated \$53,869,125—more than \$7 million above last year's reunion results.

The Class of 1957, many in new jackets to reflect the 41-year-old tradition of donning red blazers beginning with the 50th reunion, added to their class history of philanthropy with a five-year giving total of \$12,568,341. Class members gave at a high rate—68.7 percent made a gift.

The senior class, which faced the challenge of besting last year's record-breaking participation rate of 51 percent, passed that mark shortly before Commencement and turned in a 52 percent giving rate. Their donation to MIT included \$11,875 plus \$15,000 in challenge funds

from outgoing MIT Alumni Association President Martin Tang (S.M. 1972).

President Susan Hockfield thanked senior class president Susan Shin '07 during Commencement for the gift and the 10-month fundraising effort. "Thank you very much for the enthusiasm that 52 percent represents," she said.

Three classes set new giving records: the 80th reunion Class of '27 with \$8,902,542; the 45th reunion Class of '62 with \$8,848,145; and the 35th reunion Class of '72 with \$3,774,133. The 60th reunion Class of '47 reached a notable participation level at 81.6 percent.

Tang also applauded the strong results of the MIT10 Power of Participation challenge. Tang had pledged to contribute \$100,000 to support students at MIT if undergraduates who earned their degrees in the past 10 years increased their collective participation by 50 percent to 3,000 donors. Although the challenge extends until June 30, Tang released \$50,000 to acknowledge the 2,500 donors who have given \$384,633 as of June 11. "Some said that achieving an increase to 3,000 donors would be impossible," Tang noted. "My checkbook indicates the naysayers were wrong!"

Corporation announces faculty promotions

The MIT Corporation's Executive Committee has approved the following faculty members for promotion. All promotions are effective July 1.

Promotions to tenure

Unless otherwise noted, all promotions are from associate professor without tenure to associate professor with tenure.

Architecture and Planning: John Emanuel Fernandez, Joseph A. Paradiso, Deb Kumar Roy.

Engineering: Moe Z. Win, Vladimir Bulovic, Erik D. Demaine, Michael D. Ernst, Piotr Indyk, David J. Perreault, Nicola Marzari, Christopher A. Schuh.

Humanities, Arts, and Social Sciences: George-Marios Angeletos, Amy Finkelstein (from assistant professor), Ivan Werning (from assistant professor), Muhamet Yildiz, Adam J. Berinsky, David I. Kaiser, Thomas Levenson (to full professor).

Management (Sloan): Joseph Weber

Science: J. Troy Littleton, Joshua B. Tenenbaum (from assistant professor), Martin Z. Bazant, Alexander Postnikov, Gunther Roland, Senthil Todadri (from assistant professor), Vladan Vuletic.

Tenured appointments

Architecture and Planning: Rahul Mehrotra, associate professor; Nader Tehrani, associate professor; Dennis M. Frenchman, full professor.

Humanities, Arts, and Social Sciences: Roger White, associate professor.

Science: Dianne K. Newman, full professor; Jonas C. Peters, full professor; Sara Seager, associate professor; Julie Kim, associate professor; Paul A. Seidel, full professor.

Promotions to associate professor without tenure

(from assistant professor)

Architecture and Planning: John A. Ochsendorf, Judith A. Layzer.

Engineering: Emilio Frazzoli, Forrest M. White, Regina Barzilay, Karl K. Berggren, Luca Daniel, Dina Katabi, Samuel R. Madden, Asuman Ozdaglar, Francesco Stellacci, Thomas Peacock, Yang Shao-Horn.

Humanities, Arts, and Social Sciences: Jay Scheib, Sarah Song, David S. Jones.

Management (Sloan): Jared R. Curhan, Shane Frederick, David Gamarnik, Dirk Jenter, David McAdams.

Science: Amy E. Keating, James J. DiCarlo, Alice Y. Ting, Kiran S. Kedlaya, Nergis Mavalvala, Ian W. Stewart.

Promotions to full professor

(from associate professor with tenure)

Architecture and Planning: Caroline A. Jones, Nasser O. Rabbat, Hiroshi Ishii.

Engineering: Jonathan P. How, Brian C. Williams, William H. Green Jr., Rajeev J. Ram, Seth Teller, John G. Brisson II, John J. Leonard.

Humanities, Arts, and Social Sciences: Daniel Fox, Kai von Fintel, Thomas DeFrantz.

Science: Angelika Amon, Andrei Tokmakoff.



PHOTO / DONNA COVENEY

MIT Provost L. Rafael Reif, left, marches with Cambridge Mayor Kenneth Reeves.



PHOTO / DONNA COVENEY

Chancellor Phillip Clay, left, and Alex d'Arbeloff, honorary chair of the MIT Corporation, pause during the Commencement procession.

HOW TO REACH US

News Office

Telephone: 617-253-2700
E-mail: newsoffice@mit.edu
<http://web.mit.edu/newsoffice>

Office of the Arts

<http://web.mit.edu/arts>



Printed on recycled paper

News Office Staff

Executive Director Pamela Dumas Serfes
Interim News Manager Sarah H. Wright
Senior Communications Officer Patti Richards
Senior Science and
Engineering Editor Elizabeth Thomson
Assistant Director/Photojournalist Donna Coveney
Web Developer/Editor Lisa Damtoft
Operations/Financial Administrator Myles Crowley
Administrative Assistant II Mary Anne Hansen
Administrative Assistant II Patti Foley
Editorial/Production Assistant Anne Trafton
Communications Assistant Heather Manning

Tech Talk is published by the News Office on Wednesdays during term time except for most Monday holiday weeks. See Production Schedule at <http://web.mit.edu/news-office/techtalk-info.html>. The News Office is in Room 11-400, Massachusetts Institute of Technology, 77 Massachusetts Ave., Cambridge, MA 02139-4307.

Postmaster: Send address changes to Mail Services, Building WW15, Massachusetts Institute of Technology, 77 Massachusetts Ave., Cambridge, MA 02139-4307.

Subscribers may call 617-252-1550 or send e-mail to mailsv@mit.edu.

Tech Talk is distributed free to faculty and staff offices and residence halls. It is also available free in the News Office and the Information Center.

Domestic mail subscriptions are \$25 per year, nonrefundable. Checks should be made payable to MIT and mailed to Business Manager, Room 11-400, MIT, 77 Massachusetts Ave., Cambridge, MA 02139-4307.

Periodical postage paid at Boston, MA.

Ceremony 'hoods' Ph.D.s, lauds families

Anne Trafton
News Office

MIT President Susan Hockfield welcomed more than 500 new doctorate recipients into "a community of scholars" during a joyful hooding ceremony on Thursday, June 7, in Johnson Athletic Center.

The newly minted Ph.D. and Sc.D. graduates represent "not just the future of knowledge, but also the future of the academy," Hockfield said. "These people will be leaders of the academy in years to come."

Hockfield applauded the degree recipients for following the example of poet Robert Frost in choosing the road "less traveled by."

"The paths you have chosen are paths that have wanted wear—things that wanted to be discovered and needed to be discovered," she said. "Thank you for choosing the less worn path, and congratulations for successfully navigating it."

Recognizing the sacrifices made by families of the new doctorates, Hockfield asked the degree recipients to stand and acknowledge all the support their families have given them.

Those families, in turn, acknowledged the years of hard work that their loved ones devoted to their graduate study.

It was an especially proud moment for the Nolte family of St. Louis, who came out to see Adam Nolte receive his Ph.D. in materials science and engineering. Last weekend, Nolte's sister earned her dental degree from Southern Illinois University at Edwardsville.

"We're really fortunate because we've had two doctors in one week," said Nolte's mother, Denise Nolte. After watching her daughter receive her degree on Saturday, "we got on a plane and came out here."

For a while, the family feared that the two doctoral degrees would be awarded on the same day. "What are the odds of something like that happening?" Nolte laughed, as she soothed her granddaughter, Adam's daughter, 8-month-old Adelaide. Adam and his wife Suzanne also have a 2-year-old son, John Paul.

"We don't get to see them very often, so this is precious," Nolte said.

Marita Barth's family also got to spend some quality time together. Her parents, brother, sister-in-law and niece all took a red-eye flight from Oregon to see her receive her Ph.D. in biological engineering.

"The whole family came out," said Barth's sister-in-law, Stephanie Barth. "We're really proud of her. She worked so hard."

Barth, who is married to Marita's brother, Stephen, cradled her 15-month-old daughter, Anna, while waiting for the ceremony to begin. "We've been telling her all week we're going to come out to see Marita," she said.

Little Anna was just one of dozens of young children attending the celebration, which offers guests a special "stroller parking" zone outside Rockwell Cage, where the ceremony is held.

The hoods were draped around the new doctorates' necks by Chancellor Phillip Clay and professors from each department that conferred degrees. Before the hoods were given out, Clay offered some historical perspective on the hood itself, which originally was worn as a head covering but now flows down the wearer's back.

A small pouch at the bottom of the hood has no particular function but could come in handy, Clay said. It's "large enough to hold a small book, a large sandwich, or perhaps your iPod," he noted.

MIT hooding ceremonies are often an intergenerational affair, and that was true for Michael Baker, who earned his Ph.D. in electrical engineering and computer science. Baker's father, Warren, earned a Ph.D. in chemical engineering from MIT in 1966 (photo on page 5).

Today marked the end of a long MIT career for the younger Baker—he also holds bachelor's and master's degrees from the Institute. A large family contingent turned out to celebrate the end of his 11 years at MIT.

"I'm just really happy everyone came," Baker said.

Robbin Chapman also received her MIT doctoral hood today, but she's not going anywhere. Chapman, who earned a degree in electrical engineering and computer science, recently joined the School of Architecture and Planning as manager of diversity recruitment.

"I'm really happy to be working at MIT because I love it here," Chapman said. "There's no place like it."



PHOTO / DONNA COVENEY

One-year-old Hudson waves his father's mortarboard in celebration of Jason Bartolomei's new Ph.D. for his work in the Engineering Systems Division. With Bartolomei, from left, are sons Isaac, 9, and Graham, 7, three-year-old daughter Gigi and wife Tracey.



PHOTO / DONNA COVENEY

Robbin Chapman, with a new Ph.D. in electrical engineering and computer science, exchanges a hug with Blanche Staton, associate dean for graduate students.



PHOTO / DONNA COVENEY

Luis A. Marquez, left, and Zoraida Marquez stand next to daughter Jessica, a newly minted Ph.D. recipient in aeronautics and astronautics at MIT. Her brother, Víctor, stands at right.



PHOTO / STEPHANIE SCHOROW

Graduate student Ben Wood shows his drawings for the Diego Rivera mural, 'Man at the Crossroads' (1933).

Grad student revives Rivera's 1933 mural

Stephanie Schorow
News Office Correspondent

It was perhaps the most famous act of artistic destruction in modern history. After renowned Mexican artist Diego Rivera refused to alter a mural commissioned for the Rockefeller Center in New York City, the painter was sent packing and the 1933 mural demolished.

Ben Wood, a second-year graduate student in visual arts in the Department of Architecture, has long been fascinated by murals. He became intrigued with the controversy over Rivera's original commission and the copy the artist later painted in the Palacio De Bellas Artes Museum in Mexico City.

The controversy of Rivera's mural has been depicted in two recent films, "Frida" and "The Cradle Will Rock." It is well known that Rivera's design included a portrait of Lenin among the many figures; that when the press complained about it, Rivera insisted on making Lenin's figure even more prominent; and that Rivera was fired.

Wood is interested in the known and the less-known aspects of the Rivera mural tale. His research is devoted to bringing the story and the artwork to light, seeking to answer what Rivera's elaborate vision—grandiosely titled "Man at the Crossroads"—might mean to us today. Wood wondered: What is the significance of Rivera's 1934 version, even more grandiosely called "Man in Control of the Universe"? Can man ever really be in control of his destiny?

So for his MIT thesis project, Wood put together "a contemporary re-creation of Rivera's mural to consider what it means today." And now Wood has been asked to return to Mexico to create a version of his project during events marking the 50th anniversary of Rivera's death.

Wood, a native of Brighton, England, has worked on a mural project before. In 2004 he photographed a mural, completed in 1791 by Native Americans, which had been hidden for more than 200 years behind an altar in San Francisco's Mission Dolores.

Wood started working on the Rivera project in 2006; he conceived of it as a proposal to the Rockefeller Center to re-create the mural there. It didn't get accepted by the center, but "they didn't shut me down completely," he said. "I'm going to propose it again next year."

In his research in the Rockefeller Center archives, Wood obtained Rivera's original proposal for the mural, in which the artist described how man, represented as a skilled worker in the center of the mural, "looks with uncertainty but hope toward the future." He did numerous interviews here and in Mexico. He went to California to interview one of Diego's assistants and he traveled to Mexico to interview two of Diego's grandsons and his daughter. He talked to MIT's Noam Chomsky and to his own advisor, Krzysztof Wodiczko, MIT professor of visual arts. Wood's aim was to understand why the mural was

See **MURAL**

Page 6



PHOTO / SARAH PUTNAM

The bell tolled for one academic latecomer, whose 'hack' unfurled as Commencement began: six banners reading, left to right, 'Will have thesis finished pronto—IHTFP.'

Vest guides grads to optimism, service

President Emeritus Charles M. Vest delivered the commencement address on June 8. Below is an excerpt:

Before I begin, I must tell all of you that I have listened to more Commencement speeches that you can imagine. I have also invited more Commencement speakers to campuses than you can imagine.

From this I learned that students usually feel that they were shortchanged.

Hypothetically...just hypothetically...they might say things like "Jeez. Harvard got two Bills and all we got was one Chuck."

But it's OK, because I want to speak to you...not to the world. And, because this is MIT, I am going to talk to you about big things—namely opportunity and service.

Here are two things I know about opportunity:

First, MIT is the greatest place on the planet when it comes to radiating education, opportunity and service.

Second, you never know when or how opportunity will materialize. Don't try to plan it or predict it because you'll undoubtedly be wrong.

How do I know these two things about opportunity? I know them because of the two letters I received from MIT during one 22-year period. I received the first letter from MIT in 1968. It informed me that the Institute was not interested in my application to become an assistant professor.

But 22 years later, in 1990, a second letter came from MIT...this one asked me to serve as MIT's president. Not in my wildest dreams as a young faculty member could I have imagined that one day I would be called to serve as president of this remarkable institution.

So always read your mail from MIT. There is an outside chance that instead of asking for an alumni donation, it may

ask you to be president...or perhaps commencement speaker.

But my real point here is that education—and MIT—opened amazing doors of opportunities to me—opportunity to learn, opportunity to teach and opportunity to serve a greater good.

And I want you to know that the people I have most valued knowing and working with are my faculty colleagues: the intellectual leaders, the teachers and scholars who are the essence of MIT, and who give you and gave me the opportunity to literally change the world.

The opportunities for which they have prepared you will be as breathtaking as they are formidable...and most of them are beyond today's imagination. One reason is that they are mostly global in scale and very complex. Another reason is the continuous acceleration of technological progress. The future is rushing at us more quickly every year.

But along with all this acceleration and exploding information, you have entirely new tools. Many of these new tools come from information technology or from 21st-century life science.

Your generation is already leading us into a new domain of global interaction. I am convinced that your way of communicating and working: Second Life...Wikipedia...YouTube...social networking, social computing...open innovation...these things reflect a fundamental transformation.

You can and must guide this transformation. You can use it to make money. You can use it to revel in catching politicians and movie stars making stupid mistakes. Or you can use it to bring what James Surowiecki calls "the wisdom of crowds" to work together to build a more inclusive, engaged and more egalitarian world. It's your choice.



PHOTO / SARAH PUTNAM

MIT President Susan Hockfield greeted new graduates. She presented S.B., S.M. and advanced degrees in science and engineering and also presented advanced degrees from the School of Science, Woods Hole Oceanographic Institution and the Whitaker College of Health Sciences and Technology.

COMMENCEMENT

Continued from Page 1

ers? How will you influence the public discourse and action on these questions?" he questioned the sea of black-robed graduates in Killian Court.

Vest encouraged graduates to use transformative technologies such as the



Charles M. Vest

Web to "build a more inclusive, engaged and more egalitarian society" and to "be prepared to engage in the public dialogue and bring to it your own moral compasses and your commitment to applying the rationality of science and engineering to improving the human condition."

Vest said that what he most valued about his 14-year stint as president of MIT was the opportunity to serve.

"I had the opportunity to serve as a voice for science, engineering and higher education and for the importance of our nation being open to scholars from all over the world at a time when America sorely needed to think about these things," he said.

Pomp and other circumstances

Just at the moment that Chair of the MIT Corporation Dana G. Mead took the podium, six vertical white cloth panels unfurled from the portico of Killian Hall. The mini-hack read, with one word per panel: "Will have thesis finished pronto—IHTFP."

Following Vest's address, Eric Weese, president of the Graduate Student Council, spoke to the assembled graduates, friends and relatives. He said while he was surfing the Web, he came across a quote from someone earning \$150,000 a year who said that he didn't seem to be earning enough

to have any fun. "It's likely that some of us will not have all that we want," Weese said, "but it's also likely most of us will have what we need. We should keep in mind that we are among the most fortunate people ever."

Susan J. Shin, president of the Class of 2007, presented MIT President Susan Hockfield with a check for \$26,861, the senior class gift. More than half of the graduating class contributed, up from around 30 percent in recent years.

Among the graduating students, Shin said, were individuals who published research, won patents and battled life-threatening illnesses, but as a whole, "When it came to choosing between giving up and hoping, we made the right choice...We conquered our fears and doubts. We have survived the Institute."

Hockfield delivered the traditional charge to the graduates.

"It is my fervent hope that, as you join new communities, you will transmit to them the values that define the MIT community," she said. "That you will make integrity the touchstone of your judgments. That you will exemplify the pursuit of truth and an unwavering drive for excellence. And that you will continue to demonstrate the value of good, old-fashioned hard work."

The Rev. Johanna Kiefner, MIT Lutheran chaplain, delivered the Invocation, and the a cappella MIT Chorallaries sang the national anthem. The MIT Brass Ensemble, led by affiliated artist Larry Isaacson, provided accompaniment for the processional and the rest of the ceremonies.

Hockfield presented the following degrees: bachelor of science; bachelor of science/master of science; bachelor of science/master of engineering; and advanced degrees in the School of Science, the Woods Hole Oceanographic Institution and the Whitaker College of Health Sciences and Technology.

Provost L. Rafael Reif awarded advanced degrees in the Schools of Architecture and Planning; Engineering; Humanities, Arts, and Social Sciences; and the MIT Sloan School of Management.



PHOTO / DONNA COVENEY

Michael Baker, a new Ph.D. in electrical engineering and computer science, is flanked by family after the hooding ceremony. From left, cousin Bob Arthurs, father Warren Baker (Ph.D. '66), Michael Baker, mother Mary Ann Baker, sister Susanna Baker, and in foreground aunt Madlyn Arthur. See hooding ceremony story on page 3.



PHOTO / SARAH PUTNAM

New alums whose undergraduate years made them 'one' with their computers said so with their caps.

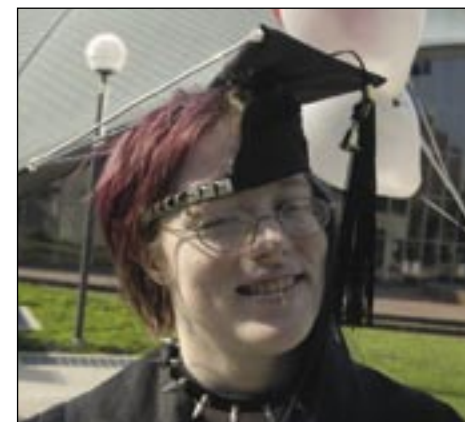


PHOTO / SARAH PUTNAM

Grace Kenney, S.B. in chemistry, applied science to hair art: She planned to use serious product to get her hair to spike up through the frame of her cap.



PHOTO / DONNA COVENEY

Senior class president Susan Shin, who earned the S.B. in biology, presented the class gift of \$26,861.



PHOTO / SARAH PUTNAM

Eric Weese, president of the Graduate Student Council, gave the crowd at Killian Court a cheerful send-off.



PHOTO / DONNA COVENEY

Giving each other congratulatory hugs after MIT's Commencement are Silpa Kaza, who received the S.B. in mechanical engineering, and Rajesh Kottamasu, who earned a master's degree in city planning. He created little windmills for his mortarboard.

Hockfield's charge to the graduates

Below is the text of MIT President Susan Hockfield's charge to the graduates, delivered at MIT's 141st Commencement held June 8.

I want to speak to those of you graduating today about your path here at MIT and the path that leads from MIT into the world. Of course, before you arrived at MIT, each of you had already demonstrated significant talents—that is why we invited you to join our community. Once you arrived here you took up MIT's challenges, and—working, I am certain, harder than you ever have before—you have taken your academic accomplishments to new levels. Today's ceremony is our community's expression of our pride in what you have achieved.

Our appreciation of your accomplishments would be far too narrow if it included only your academic successes. Beyond the classroom and the laboratory, you have also excelled on the stage and on the playing field, in service projects and in entrepreneurship. And, what is perhaps most important, you have also begun to distinguish yourselves as leaders.

MIT itself has a deep commitment to leadership, demonstrated time and again, in myriad ways:

- In the foundational science that led to the new targeted cancer therapies, Gleevec for leukemia and Herceptin for breast cancer;
- In innovative plans to rebuild devastated New Orleans neighborhoods;
- In countless businesses, from startups in Kendall Square to industry giants across the technology landscape;
- In fresh approaches to meeting the world's energy needs, including new technologies for energy storage and for solar energy conversion;
- And in novel uses of technology to convey the immortal truths of the humanities.

And in many different ways—from the UROP program to the \$100K competition, from 2.007 to the Public Service Center—our goal has been to teach you how to become leaders yourselves.

We have done this, graduates of MIT, because the world today needs your leadership. We need your leadership as we face the challenges of an increasingly complex and interdependent world. And we need your leadership to develop new ways to bridge old divides—not only between peoples and nations, but also between technology and policy. MIT's enduring motto, "Mens et Manus"—"Mind and Hand"—is a reminder that leadership in the modern world depends critically on integrating across different perspectives for the common good.

From one point of view, the leadership we call you to assume today might appear

to be an obligation, perhaps a burden. But that would be a grave mistake. Leadership is a privilege and it is a joy. And I can assure you that in using your talents to serve others, you will find the most enduring of personal satisfactions.

Even as you leave this place to become your generation's leaders, you will remain members of this community. At the close of this morning's ceremony, Martin Tang, the President of the Alumni Association, will formally welcome you into the Association's membership. And we hope that your lives will be enriched by an ongoing connection to the Institute.

And it is my fervent hope that as you join new communities, you will transmit to them the values that define the MIT community. That you will make integrity the touchstone of your judgments. That you will exemplify the pursuit of truth and an unwavering drive for excellence. And that you will continue to demonstrate the value of good, old-fashioned hard work.

Beyond these great aspirations for you, I make a more pressing request: I ask of you to inspire your own generation and the generations to come with a renewed sense of optimism for the future.

MIT's founding vision was both practical and idealistic in its insistence that our work must, as engraved across the frieze of Lobby 7, advance "industry, the arts, agriculture, and commerce." That optimism for a better future has made MIT a beacon visible the world over. This weekend, we will celebrate MIT's optimism for the future by reigniting one of our most powerful symbols. After the late summer sunset tomorrow evening, for the first time in more than three decades, we will fully re-light the great dome.

The lighting of the dome signals the importance of what we do. Here at MIT, we see up close, every day, the countless ways that science and technology benefit humankind. But if we are to realize our optimism, we need to kindle in others the same love and passion for truth and discovery, for creativity and problem-solving, that brought us all here. I hope that each of you will embrace this challenge as your own—that you will let your light shine out to illuminate the paths for others.

I would not set you this challenge if I did not think, and truly believe, that you could meet it. I have tremendous faith in you. Your intelligence, your dedication and your creativity have inspired us during your time here. And I know that in the years to come you will do even more—and surprise and delight us with your further achievements.

For your accomplishments here at MIT, I offer you my heartfelt congratulations, graduates of MIT!



PHOTO / SARAH PUTNAM

Sandra Lee Falk Rindler featured a bursting-brain-themed mortarboard to celebrate receiving the S.B. in brain and cognitive sciences.



PHOTO / L. BARRY HETHERINGTON

Andrew 'Zoz' Brooks' mortarboard reflects the subject of his Ph.D. thesis, coordinating human-robot communication.



PHOTO / DONNA COVENEY

Christine McEvilly, who earned an S.B. in history, created this replica of the Church of the True Cross in Seville, Spain, on her mortarboard.



PHOTO / DONNA COVENEY

Sharlene Leurig, who earned a master's degree in urban planning, created a 'swimmable river' on her mortarboard.



PHOTO / SARAH PUTNAM

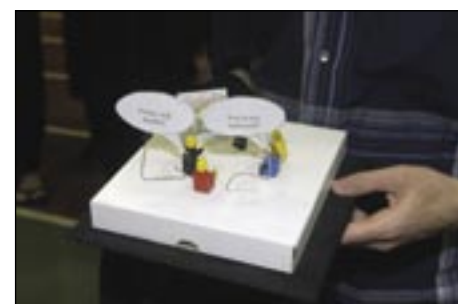


PHOTO / SARAH PUTNAM

Adam Marcus (left), who received a master's degree in city planning, dramatized some of the challenges of his chosen field on his cap (above).

Kabcenell Foundation awards MITEI \$1 million for new curricula

Deborah Halber
News Office Correspondent

When Paul L. Joskow, the Elizabeth and James Killian Professor of Economics, offered a new class on the economics of energy markets, he intended to limit the class to 30.

One hundred students showed up on the first day. "I took 50. That's all the seats there were in the room," Joskow said.

The economics class was one of five new energy subjects offered for the first time this spring, joining approximately 75 others offered across the Institute. There's no doubt that classes on almost any aspect of energy are in demand at MIT. Student enrollment in energy-related classes has tripled since 2002, according to the registrar. But faculty from separate departments can find it challenging logistically to develop interdisciplinary subjects.

Thanks to a \$1 million gift from the Dirk and Charlene Kabcenell Foundation, the MIT Energy Initiative's (MITEI) Energy Education Task Force will gain a big boost in its ability to develop new curricula and strengthen existing programs, said task force co-chair Jefferson W. Tester, the H.P. Meissner Professor of Chemical Engineering.

"Education of a next generation of energy technology innovators, entrepreneurs, policy-makers—with a passion for environmental stewardship—and a scientifically literate citizenry that can help shape the public discourse on energy and environment is in many ways our core MITEI commitment," said Ernest J. Moniz, the Cecil and Ida Green Professor of Phys-

ics and Engineering Systems and MITEI director. "The Kabcenell gift provides the foundation for honoring that commitment."

Designing classes specifically with energy in mind "really adds a new dimension that we haven't had before. A lot of the new subjects we now teach and will develop in the future have a multidisciplinary focus that requires institutional support," Tester said.

The global energy challenge "is a complex, multifaceted issue and it will take all our collective resources to tackle the problem," said MIT alumna Charlene Kabcenell. "Encouraging cross-department collaboration is really important."

The Kabcenell Foundation grant "provides resources that are invaluable to developing these collaborative efforts," Tester said. "It frees up faculty time to develop new ideas. Also, to get faculty across departments to work with one another is pretty neat—we're excited about having that opportunity."

Through a California-based foundation in their names, Dirk (S.B. 1975) and Charlene (S.B. 1979) Kabcenell have been awarding grants in environmental and energy education for several years. Both electrical engineering and computer science graduates, the Kabcenells take a personal interest in climate change issues and alternative forms of energy. (One of their cars is electric and one is a hybrid).

"Energy issues are the defining issues of our times," said Dirk Kabcenell. "MIT has a history of working on problems in the world that really matter and certainly has the capabilities to be a leader in solving this one."

STEM CELLS

Continued from Page 1

genetically manipulating mature skin cells from a mouse, the scientists transformed these cells back into a state identical to that of an embryonic stem cell. No eggs were used, and no embryos destroyed.

"These reprogrammed cells, by all criteria that we can apply, are indistinguishable from embryonic stem cells," says Jaenisch.

What's more, these reprogrammed skin cells can give rise to live mice, contributing to every kind of tissue type, and can even be transmitted via sperm or eggs to succeeding generations. "Germline transmission is the final and definitive proof that these cells can do anything a traditionally derived embryonic stem cell can do," adds Jaenisch.

"But," he cautions, "these results are preliminary and proof of principle. It will be a while before we know if this can ever be done in humans. Human embryonic stem cells remain the gold standard for pluripotent cells and it is a necessity to continue studying embryonic stem cells through traditional means."

In August 2006, researchers at Kyoto University reported that by activating four genes in a mouse skin cell, they could reprogram that cell into a pluripotent state resembling an embryonic stem cell. However, the resulting cells were limited when compared with real embryonic stem cells, and the Kyoto team was unable to generate live mice from these cells.

The Jaenisch team decided to replicate this experiment, while refining certain technical aspects. This group included Jaenisch lab postdocs Marius Wernig, Alexander Meissner and Tobias Brambrink, MIT graduate student Ruth Foreman, Manch-

ing Ku, a research fellow from Bradley Bernstein's lab at Massachusetts General Hospital, and Konrad Hochedlinger at Massachusetts General Hospital.

Using artificial viruses called vectors, the team activated the same four genes in a batch of mouse skin cells. These genes, Oct4, Sox2, c-Myc and Klf4, are called transcription factors, meaning that they regulate large networks of other genes.

"We were working with tens of thousands of cells, and we needed to devise a precise method for picking out those rare cells in which the reprogramming actually worked," says Wernig. "On average, it only works in about one out of 1,000 cells."

To test for reprogramming, the team zeroed in on Oct4 and another transcription factor called Nanog. These two hallmarks for embryonic stem cell identity are only active in fully pluripotent cells. The trick was to figure out a way to harvest Oct4- and Nanog-active cells from the rest of the population.

That done, the team ran these cells through a battery of tests, seeing if they could discover any substantial differences between these cells and normal embryonic stem cells.

"In all tests...there were no molecular markers distinguishing these two groups," says Meissner.

Definitive proof came when the team demonstrated that these cells could indeed develop into any kind of body tissue and cell type.

Still, many technical hurdles remain for possibly translating this work to human cells. For example, the technique used to isolate the pluripotent cells does not yet work in human embryonic stem cells.

This research is supported by the National Institutes of Health.

LERMAN

Continued from Page 1

masters of the graduate residence at 224 Albany Street since its opening in 2000.

Clay praised Lerman for "a remarkable ability to build bridges between people and groups and to develop consensus through consultative processes," noting that he would continue the collaborative approach that has marked initiatives the Graduate Students Office (GSO) has launched under the leadership of retiring Dean for Graduate Students Isaac M. Colbert.

Lerman has played a leading role in innovative educational uses of technology for more than a quarter-century, having served as first director of MIT's Project Athena during the 1980s. He has been director of the Center for Educational Computing Initiatives since its founding in 1991, and he chairs the Faculty Advisory Committee for MIT OpenCourseWare.

Lerman was formerly deputy director of the Singapore-MIT Alliance, of which he is currently acting MIT co-director. He has also served as director of the Intelligent Systems Lab and head of the transportation systems division in his department.

MURAL

Continued from Page 3

destroyed, what the mural means, and what its implications might be for today.

Then, with computer technology and using an image of the 1934 mural, he made the mural "speak"; the painted figures come to life and morph into the faces of people interviewed by Wood. On May 18, Wood presented his thesis as a 17-minute video, projected on a wall at MIT.

Now Wood has a chance to take his project to Mexico. He is working with the National Museum of Art in Mexico City to create a project on Rivera's mural at the museum to mark the 50th anniversary of Rivera's death in November. He will either present a version of his thesis project—with the interviewees speaking in Spanish—or he will recreate the mural in an entirely new way, seeking people to interview to represent the themes of the work.

Rivera's own politics, his experience at the intersection of the Rockefeller family, their business interests and the political

A member of the Class of 1972, Lerman went on to receive his master's and doctoral degrees from MIT and joined the Institute faculty in 1975. His department and the Graduate Student Council have both honored him for excellence in teaching; his primary teaching is currently in subject 1.00/1.001, an introduction to computational methods that is taken by both undergraduates and graduate students.

In his message, Clay thanked the search advisory committee chaired by Professor Stephen C. Graves of the MIT Sloan School of Management, which also provided significant insight into the operation of the Graduate Students Office and the challenges facing the new dean.

Lerman noted that his work as a graduate housemaster has made him aware of the importance of the work of the GSO in issues that cut across departments, labs and centers: "The office will continue to support MIT's efforts to expand the diversity of the graduate student population and develop programs that make all graduate students' experiences here at MIT as productive and fulfilling as possible."

winds that blew through America during the Depression, Wood acknowledged, affected the mural's fate.

But Wood seeks to probe more deeply the context of why the mural was destroyed. "I think it's too simple to say it was the head of Lenin that was the reason for its destruction."

Wood also examines Rivera's utopian vision: how, for example, he depicted the man at the crossroads as a white Anglo Saxon. Wood is keenly interested in what is "wrong" with the mural, that is, what is there and what is not there.

Rivera's vision might even be considered "totalitarian," that is, "he is trying to present this vision of the future, the different elements that will allow a more ethical future, an ideal world. But at the same time the elements in there are prohibiting us, because they are his vision of a better world." Those elements included Rivera's vision of the growth of Communism in the capitalist, multicultural society of the United States, Wood said.

DEANS

Continued from Page 1

tor of the Center for Innovation in Product Development from 1999 to 2001.

Eppinger received S.B., S.M. and Sc.D. degrees from MIT's Department of Mechanical Engineering before joining the MIT Sloan faculty in 1988. His educational initiatives have included the creation of an interdisciplinary product development course in which graduate students from engineering, management and industrial design programs collaborate to develop new products; he also teaches product development in MIT Sloan's executive programs.

Reif noted that the May 15 groundbreaking for the school's new facilities had provided "a fitting capstone" to nine years of service by Professor Richard Schmalensee, who announced in September his intention to step down at the end of the academic year as the school's John C. Head III Dean. A faculty search advisory committee and external advisory committee are continuing their wide-ranging search to identify the next dean, and an appointment is expected in the next few months.

Shortly after Reif's announcement, Eppinger announced to the MIT Sloan

community the appointments of Yates, Kothari, Fernandez and Pindyck to their new roles. As deputy deans, Yates, the Sloan Distinguished Professor of Management and an expert on communication and technology use in organizations, will have responsibility for the school's degree programs, while Kothari, the Gordon Y. Billard Professor of Management and an expert on financial reporting and capital markets, will work on faculty issues, including hiring, promotion, mentoring and research. Eppinger noted that it had been a privilege to work closely with Paul Osterman, the Nanyang Technological University Professor of Human Resources and Management, who is stepping down as deputy dean after serving in that role since 2003. Eppinger will continue to oversee executive programs, while Senior Associate Dean Alan F. White will retain oversight of international initiatives.

Fernandez is the William F. Pounds Professor of Management and an expert in organizational behavior and social networks. Pindyck is the Bank of Tokyo-Mitsubishi Professor of Economics and Finance and an expert in investment decisions. The school's management science area will continue to be led by John R. Hauser, the Kirin Professor of Marketing.

mail bales@mit.edu or call x3-6178.

Macintosh Classic w/ case & manuals, access. \$120, call x8-7851.

CLASSIFIED ADS

HOUSING

Two-family home in Truro, MA. Top floor two bedrooms & first floor extra large studio. \$584,500. For more info, please call John Foley at 508-246-2689.

Wayland family home for sale. 2 master bedroom suites, 4 bedrooms. Gardens galore. 17 miles from MIT. See <http://www.29Highgate.com>. Prof. Gerald Wilson 508-653-0756.

VACATION

Berkshires time share at Oak n' Spruce Resort in South Lee, MA: 1 week in Feb. peak ski season to exchange around the world, sell for \$20,000. Call Ewa at 617-448-6963.

VEHICLES

2005 Dodge Grand Caravan SXT. 36K, Sony DVD

entertainment system, climate control, CD/FM/AM changer, stow away seats, great condition. \$15,500 or BO, call anytime 617-921-4253.

FOR SALE

Drexel Heritage "Bel Aire" TV armoire & credenza. \$500 apiece, or \$900 for both. 9-drawer, stone-top credenza & 3-drawer TV armoire have stylish, Mission-inspired distressed finish. Large, heavy pieces. For photos & measurements, e-

MISCELLANEOUS

Swim lessons/workouts for children or adults. Red Cross certified instructor. Intelligent & enjoyable lessons & workouts. Contact Betty Lou at bl@media.mit.edu or 617-230-0402.

**O. Reid Ashe Jr.**

Chief Operating Office, Media General

Term: Five years (Alumni Association Nominee)

Education: S.B. 1971 (MIT), completed the Business School Program for Management Development (Harvard)

Current MIT Activities: Member, Board of Directors, Technology Review; Reunion Gift Committees (class of '71)

**Carly S. Fiorina**

Former CEO, Hewlett-Packard

Term: Five years (Corporation member since 2004)

Education: B.A. 1976 (Stanford), M.A. 1980 (University of Maryland, Robert H. Smith School of Business), M.S. 1989 (MIT Sloan School)

Current MIT Activities: Visiting Committees for Libraries, and Earth, Atmospheric and Planetary Sciences. Member, Corporation Membership Committee.

**Norman E. Gaut**

Chair, Semaco

Term: Life Member (Corporation member since 1997)

Education: B.A. 1959 (UCLA), M.S. 1964 (MIT), Ph.D. 1967 (MIT)

Current MIT Activities: Visiting Committee for Civil and Environmental Engineering, Earth, Atmospheric and Planetary Sciences (chair since 1997), Nuclear Science and Engineering, and Whitaker College. Member, Audit Committee since 2000. Active with MIT Venture Mentoring Service.

MIT Honors: Founding Life Sustaining Fellow (1979)

**John W. Jarve**

Managing Director, Menlo Ventures

Term: Five years (Alumni Association member, 1998-2003)

Education: S.B., S.M. 1978 (MIT), M.D. 1983 (Stanford)

Current MIT Activities: Visiting Committees for Dean of Undergraduate Education and Corporation Development Committee. Director and past president, MIT Club of Northern California.

MIT Honors: Bronze Beaver Award (1998), Harold E. Lobdell '17 Distinguished Service Award (1991)

**Harbo Peter Jensen**

Vice President, ChevronTexaco Global Technologies Services Company

Term: Ex officio for one year, as president of the Association of Alumni and Alumnae of MIT (2007-2008); former Corporation member, 1999-2004

Education: B.A. 1971 (Northeastern University), Ph.D. 1974 (MIT)

Current MIT Activities: Visiting Committees for the Biological Engineering Division and Materials Science and Engineering.

MIT Honors: Harold E. Lobdell '17 Distinguished Award (1986), Bronze Beaver Award (1994)

MIT Corporation names new members at meeting

The MIT Corporation, the Institute's board of trustees, elected eight term members and two life members at its quarterly meeting on Friday morning, June 8, before the Commencement exercises. Dana G. Mead, chair of the Corporation, announced the election results. All memberships are effective July 1. Mead also announced that Abigail P. Johnson was elected earlier in the year to fill an unexpired term that began on January 1.

The new life members are L. Robert Johnson, Class of 1963,

and Norman E. Gaut. Johnson has been an Alumni Association nominee to the Corporation since 1996 and served as president of the Alumni Association in 2001-2002. Gaut received his M.S. degree from MIT in 1964 and his Ph.D. in 1967, and has been a term member of the Corporation since 1997.

It was also announced at the meeting that Harbo Peter Jensen has been named the 2007-2008 president of the Association of Alumni and Alumnae of MIT. As such, he becomes an ex officio member of the Corporation. Jen-

sen served a previous five-year term on the Corporation from 1999-2004 as an alumni nominee. He succeeds Martin Y. Tang, who returns to the Corporation to complete his five-year term that will conclude in 2009.

As of July 1, the Corporation will consist of 70 distinguished leaders in education, science, engineering and industry; of those, 20 are life members and eight are ex officio.

An additional 34 individuals are life members emeritus, participating in meetings, but without a vote.

**L. Robert Johnson**

Managing Partner, Founders Capital Partners

Term: Life Member (Corporation member since 1996)

Education: S.B. 1963 (MIT), M.B.A. with distinction 1965 (Harvard)

Current MIT Activities: Visiting Committee for Biology, Physics, and Earth, Atmospheric and Planetary Sciences. Member, Corporation Development Committee, Club of Southern California (life director since 2007).

MIT Honors: Life Sustaining Fellow (1979), Henry B. Kane Award (1988), Harold E. Lobdell Award (1993), Bronze Beaver Award (1996), Marshall B. Dalton '15 Award (1999)

**Alan G. Spoon**

Managing General Partner, Polaris Venture Partners LLC

Term: Five years (Corporation member since 2002)

Education: S.B., S.M. 1973 (MIT, Sloan School), J.D. 1976 (Harvard Law School)

Current MIT Activities: Visiting Committee for Political Science and Dean of Student Life. Member, Advisory Committee on Shareholder Responsibility (chair since 2006), Dean's Advisory Council for Sloan School, Alfred P. Sloan Management Society, and Sloan Management Review Board.

MIT Honors: Eastern College Athletic Association Award for outstanding student/athlete (1973)

**Frederick A. Middleton Jr.**

Managing Director and Founder, Sanderling Ventures

Term: Five years (Alumni Association Nominee)

Education: S.B. 1971 (MIT), M.B.A. with distinction 1973 (Harvard Business School)

Current MIT Activities: Member, Sigma Chi Fraternity, Earth, Atmospheric and Planetary Sciences Visiting Committee, Corporation Development Committee. Advisory Director for MIT Center for Cancer Research; active in establishing Center for Learning and Memory.

**Abigail P. Johnson**

President, Fidelity Employers Services Company

Term: 18 months (to fill an unexpired term)

Education: B.A. 1984 (Hobart and William Smith Colleges), M.B.A. 1988 (Harvard Business School)

**Diana Chapman Walsh**

President, Wellesley College

Term: Five years

Education: B.A. 1966 (Wellesley), M.S. 1971 (Boston University), Ph.D. 1983 (Boston University, University Professors Program)

**Raymond C. Kurzweil**

Chair, CEO, Kurzweil Technologies

Term: Five years (Corporation member since 2005)

Education: S.B. 1970 (MIT)

Current MIT Activities: Visiting Committee for Biological Engineering Division, and Media Lab/Media Arts and Sciences.

MIT Honors: Lemelson-MIT Prize (2000), MIT Inventor of the Year Award (1988)

**Barun Singh**

Owner, CEO, Thinkify LLC

Term: Five years (Recent Classes Nominee)

Education: B.A., B.S. 1999 (Auburn University), M.S. 2001 (University of Michigan), M.S. 2006 (MIT)

Current MIT Activities: Opinion Editor for *The Tech*.

MIT Honors: William L. Stewart Jr. Award (2006), Avery Allen Ashdown Award (2006), National Science Foundation Graduate Research Fellowship (2001-2004), Ashdown Outstanding Officer Award (2002)

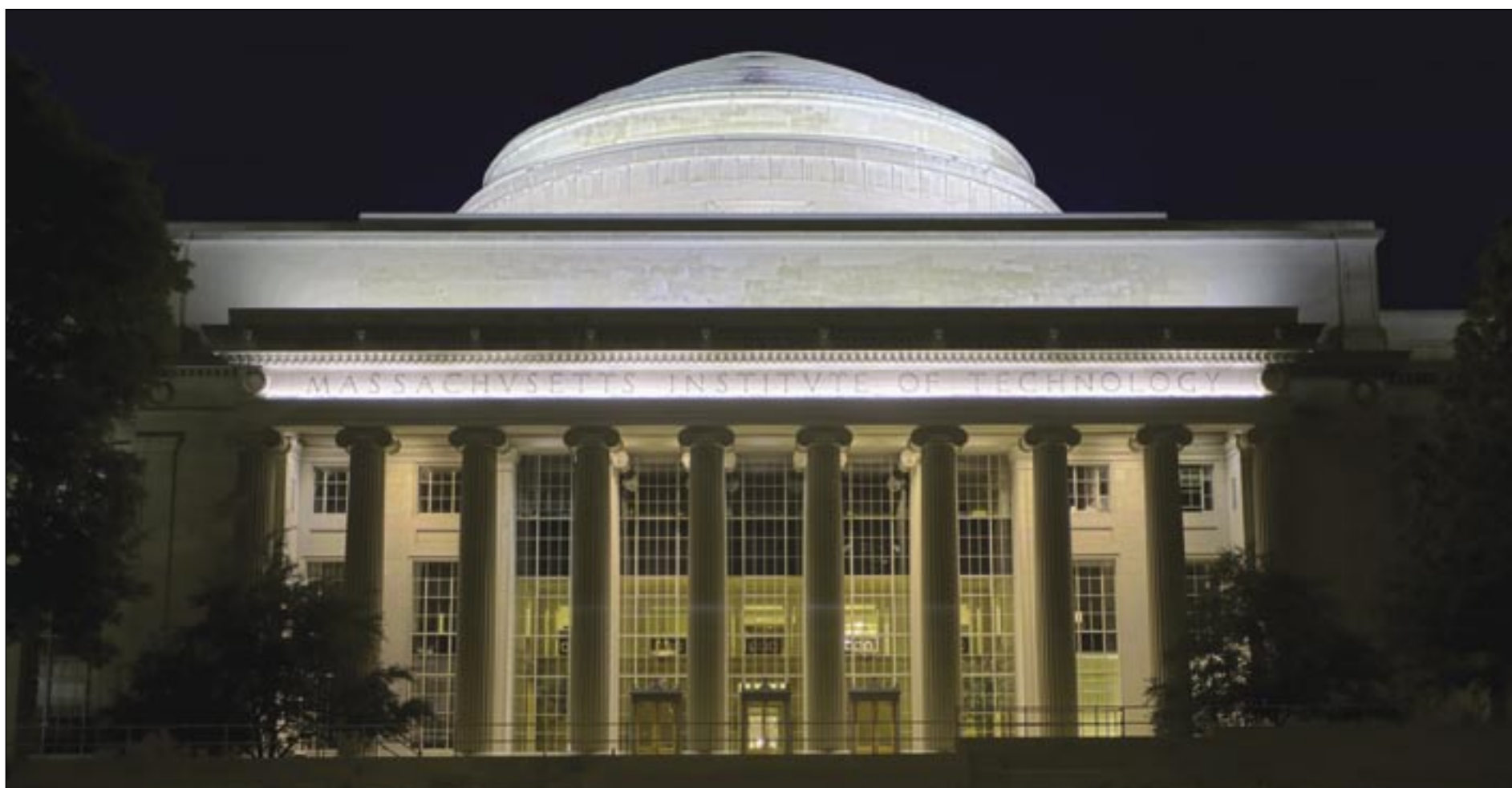


PHOTO / CHRIS BROWN

Night light

MIT President Susan Hockfield led a ceremony June 9 to re-light Building 10's iconic Great Dome. The 12 new energy-efficient fixtures use the same amount of electricity needed to run two hair dryers to illuminate the dome, the Roman numerals that spell out 1916 (the year the building opened) and the limestone façade. The new lighting system incorporates energy-saving light-emitting diode (LED) fixtures and is made possible through the generosity of an anonymous donor. The donor also provided funds to help pay for a 40-kilowatt solar photovoltaic array to be connected to MIT's electrical grid. This new solar power system will ultimately provide three to four times the electrical energy consumed by the dome lighting, according to the chief engineer on the project. The purchase of this solar array also is supported by a grant from the Massachusetts Technology Collaborative.

WIRELESS

Continued from Page 1

counter. "It was probably the sixth time that month that I was awakened by my cell phone beeping to let me know that I had forgotten to charge it. It occurred to me that it would be so great if the thing took care of its own charging," he said.

So Soljacic started thinking about which physical phenomena could make this a reality.

Various methods of transmitting power wirelessly have been known for centuries.

Perhaps the best-known example is electromagnetic radiation in the form of radio waves. But while such radiation is excellent for wireless transmission of information, it is

very inefficient for power transmission. Since radio waves spread in all directions, a vast majority of the power from such a source would be lost to the environment.

Then Soljacic thought about the phenomenon behind electric motors and power transformers. These devices contain coils that transmit energy to each other by electromagnetic induction: a current running in an emitting coil induces another current in a receiving coil.

He realized that something similar could potentially transfer energy over longer distances. A power transmitter would fill the space around it with a "nonradiative" electromagnetic field. Energy would only be picked up by gadgets specially designed to "resonate" with the field. Most of the energy not picked up by a receiver would be reabsorbed by the emitter. WiTricity is based on that concept.

Two objects of the same resonant frequency tend to exchange energy efficiently. A child on a swing is a good example of mechanical resonance.

The MIT team focused on magnetically coupled resonance, which is particularly

suitable for everyday applications because most common materials interact very weakly, if at all, with magnetic fields. As a result, interactions with objects other than the transmitter and receiver are suppressed even further, making the system that much more efficient. "The fact that magnetic fields interact so weakly with biological organisms is also important for safety considerations," Kurs points out.

The MIT system uses two copper coils, each a self-resonant system. One of them, attached to the power source, is the sending unit. It fills the space around it with a nonradiative magnetic field. That nonradiative field mediates the power exchange with the other, receiving coil, specially designed to "resonate" with the field.

With such a design, power transfer still has a limited range. But the researchers expect that power levels more than sufficient to run a laptop can be transferred over room-sized distances, even when environmental objects completely obstruct the line of sight between the two coils.

Said Fisher, "As long as the laptop is in a room equipped with a source of such wireless power, it would charge automatically, without having to be plugged in. In fact, it would not even need a battery to operate inside such a room."

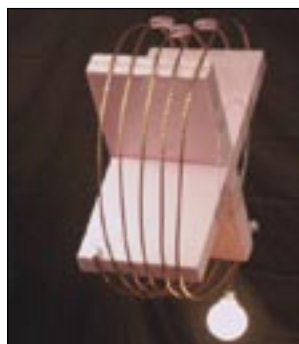
WiTricity is rooted in well-known laws of physics. So why hadn't anyone thought of the concept before now?

Joannopoulos said, "Portable electronic devices, such as laptops, cell phones, and iPods have become widespread, and they all require batteries that need to be recharged."

This work was funded by the Army Research Office (through the Institute for Soldier Nanotechnologies), the National Science Foundation and the Department of Energy.



Marin Soljacic



PHOTOS / ARISTEIDIS KARALIS

Biology professor Hazel Sive is named associate dean of the School of Science

Marc Kastner, Donner Professor of Science and head of the physics department, has announced the appointment of biology professor Hazel Sive to the position of associate dean for the School of Science, effective July 1. Sive will be the first associate dean in the school's history. In her new role she will focus on educational issues and initiatives.

"I am delighted that Professor Sive has agreed to be the first associate dean of the School of Science," said Kastner, who will become the dean of the School of Science on July 1. "She brings a passionate commitment to undergraduate education and is especially dedicated to expanding international educational opportunities for our students. I think she and I will work well together in addressing many challenges facing the school."

Sive is currently chair of the undergraduate program in the department of biology. She has done an "outstanding job

running the undergraduate program in biology—she has good ideas and is very effective in bringing them to fruition," said Professor Chris Kaiser, head of the department of biology. "I look forward to working with her on educational initiatives in the School of Science in her new role as associate dean."

Sive is a member of the Whitehead Institute for Biomedical Research. She will continue to run an active research program in the Whitehead that focuses on two major topics: development of the extreme anterior (front) of the embryo and development of the nervous system, including the genetic basis for formation of correct brain structure. She uses frogs and zebrafish to probe these basic processes, which give insight into human birth defects and mental health disorders.

"I am very privileged to be a Member of the Whitehead Institute and a professor at MIT and to be able to perform research in an environment where everything seems possible. I feel privileged to teach and mentor our talented undergraduates, graduate students and postdocs. And I feel privileged to serve MIT further by helping to set directions for the School of Science," Sive said.

In addition to her research and departmental activities, Sive is program director for a new MIT/South Africa Program. Previously, she served as the co-chair of the MIT Global Education and Opportunities Committee and chair of the Committee on Student Life at MIT. She serves on National Institutes of Health and National Science Foundation grant review panels, as a journal editor and on the Board of the American Association of Anatomists.

Sive earned her Ph.D. from Rockefeller University in 1986 and performed postdoctoral research at the Fred Hutchinson Cancer Center in Seattle. She was named a Searle Scholar and received a National Science Foundation Young Investigator Award. She arrived at MIT and Whitehead in 1991.



PHOTO / FURNALD/GRAY PHOTOGRAPHY

Biologist Hazel Sive, new associate dean of science.

Last Tech Talk until September

The News Office will resume production of Tech Talk in September. For daily updates on MIT news, people and events, please go to web.mit.edu/newsoffice.