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TechTalk

SERVING THE MIT COMMUNITY

David H. Koch Institute for Integrative Cancer Research groundbreaking

An artist's rendering of the new David H. Koch Institute for Integrative Cancer Research at MIT, which will be constructed at the corner of Main and Ames streets. Groundbreaking on the research institution was held on March 7, for more on the event **see page 8**.

MIT boosts aid for students

Increases number of undergraduates who can attend tuition-free

More MIT students will have their tuition and fees completely covered next year under a series of financial aid enhancements that the Institute unveiled March 7.

Under the new plan, families earning less than $75,000 a year will have all tuition covered. For parents with total annual income below $75,000 and typical assets, MIT will ensure that all tuition charges are covered with an MIT scholarship, federal and state grants and/or outside scholarship funds. Nearly 30 percent of MIT students fall into this tuition-free category.

For families earning less than $75,000 a year, MIT will eliminate the student loan expectation. MIT will no longer expect students from families with total annual income below $75,000 and typical assets to take out loans to cover expenses beyond tuition. Under this provision, for example, students in this income group who participate in MIT's paid Undergraduate Research Opportunities Program (UROP) each semester would be able to graduate debt-free.

For families earning less than $100,000, MIT will eliminate home equity in determining need. On average, this will reduce parental contributions by $1,600. For families who rent rather than own a home, MIT will provide a comparable reduction in the expected parental contribution.

MIT will reduce student work-study requirements for all financial aid recipients. During the past decade, MIT has steadily lowered the amount it expects students to provide through term-time work. MIT will take a further step in this direction by reducing the work-study expectation for all financial aid recipients by an additional 10 percent.

The Institute has a long tradition of opening its doors to talented students from a full range of economic backgrounds. For more than four decades, MIT has made its undergraduate financial aid decisions by following a three-part financial aid philosophy.

"First, we are need-blind in admissions, meaning that we admit all undergraduates on the basis of academic merit alone, without considering their ability to pay," said Dean for Undergraduate Education Daniel

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Marine bacteria's mealtime dash is a swimming success

Denise Brehm
Civil and Environmental Engineering

Goldfish in an aquarium are able to dash after food flakes at mealtime, reaching them before they sink or are eaten by other fish. Researchers at MIT recently proved that marine bacteria, the smallest creatures in the ocean, behave in a similar fashion at mealtime, using their swimming skills to reach tiny food patches that appear randomly in the ocean blue.

The behavior of bacteria at these small scales could have global implications, possibly even impacting the oceans' health during climate change.

Scientists in the Department of Civil and Environmental Engineering demonstrated for the first time in lab experiments that the 2-micron-long, rod-shaped marine bacterium P. haloplanktis is able to locate and exploit nutrient patches extremely rapidly, thanks to its keen swimming abilities.

Food sources for these microorganisms come as dissolved nutrients and often appear as localized patches that, if not eaten, are rapidly dissipated by physical processes like diffusion. Foraging, then, becomes a race against time for a bacterium. A rapid response gives it a strong advantage over competitors and may allow it to take up nutrients before they undergo chemical changes. A paper published in the March 10 online edition of the Proceedings of the National Academy of Sciences describes the research.

"Our experiments have shown that marine bacteria are able to home in very rapidly on short-lived nutrient patches in the ocean," said Roman Stocker, the Doherty Assistant Professor of Ocean Utilization and lead author on the paper. "This suggests that P. haloplanktis' performance is finely tuned to the oceanic nutrient landscape. If you are a bacterium, the ocean looks like a desert to you, where food mostly comes in small patches that are rare and ephemeral. When you encounter one, you want to use it rapidly."

Co-authors on the paper are postdoctoral associate Justin Seymour, graduate student Dana Hunt and Associate Professor Martin Polz, all of MIT, and Assistant Professor Azadeh Samadani of Brandeis University.

The researchers were able to prove the behavior of P. haloplanktis by recreating a microcosm of the bacteria's ocean environment using new technology called microfluidics. Microfluidics consists of patterns of minute channels engraved in a clear rubbery

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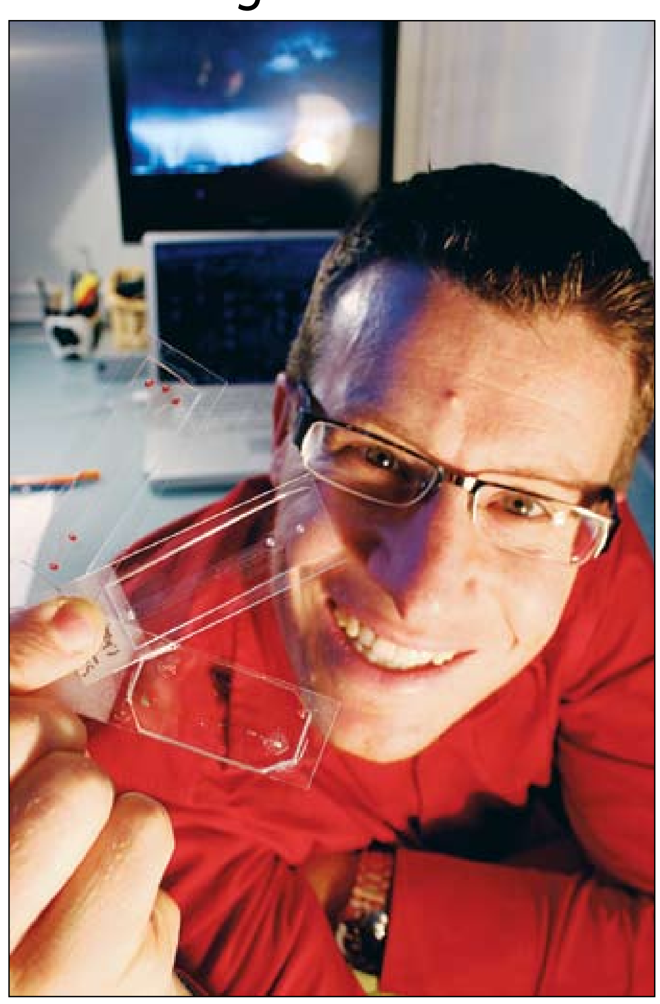

Roman Stocker, the Doherty Assistant Professor of Ocean Utilization, holds microfluidics devices.

Voting for more than just either-or

David Chandler
News Office

Traditional voting systems allow people to make only a single choice—a limitation many voters find frustrating, particularly when there is a crowded field of candidates, as there was early in the current presidential nominating cycle.

But it doesn't have to be that way.

Alternative voting systems, which allow people to rank their preferences in order instead of simply picking one, have been known for centuries, but have been devilishly difficult to implement and often result in a very slow tallying of results. One example is the system used in the Iowa caucuses, in which supporters of candidates who fail to reach a certain threshold in the first round can then move on to their second choices, and so on, until a clear winner emerges.

A new computer software system developed by MIT researchers promises to make such ranking systems just as easy as traditional voting—and to give results that leave more people satisfied. The system is about to get its first mass-market trial with the cable music network MTV.

Benjamin Mako Hill, while he was a graduate student in the MIT Media Lab's Computing Culture group, created a system called Selectricity, which has been online as a free service since last fall and is about to unveil an upgraded version with more options. With this software, any user can go to the web site (www.selectricity.org) and set up a "Quickvote" in just a few seconds, and users anywhere who have access to the Internet can then cast their votes, providing an instant tally.

There's even an ultrasimple version that works through cell phones using basic text messaging. The system is so simple that hundreds of people have been using it for decisions as simple and immediate as where to go for dinner or when to hold a meeting.

But the system is also sophisticated enough to handle real elections, at least on a small scale. In February, a beta version of the new, improved software was used by a national student organization to elect its first board of directors—and the way that election turned out was a dramatic confirmation of the value of the new system.

Each of 16 campus chapters of the group Students for Free Culture got an equal vote to select five members of its governing board from among a slate of 13 candidates. But, as it turned out, the result would have been very different had they used a traditional voting system.

Hill, now a research fellow at MIT's new Center for Future Civic Media, says "the first-place winner in plurality didn't even make it into the top five" using the more sophisticated preferential voting system, in which each chapter was able to rank all of the candidates in order of preference. That candidate, who would have been the winner in an ordinary election, "was ranked first more than any other candidate"—four first-place votes out of 16—but "he was very polarizing and was ranked near last on most of the other ballots," Hill explains. So in a traditional vote, the vast majority of the voters would have been very unhappy with the outcome.

Instead, with the Selectricity preferential voting system—which allows the results to be scored using any of a variety of different known mathematical systems for selecting winners—the first-place winner using most of the methods had only two first-place votes, but was in the top three or four on almost every ballot.

"It ended up being a real example of the power of preferential elections," leaving a majority of voters satisfied, Hill says.

Selectricity users can pick which selection method to use when they set up a ballot, but once votes are cast the web site also allows users the option of analyzing the results using several alternative methods, so that the outcomes can be compared.

MTV is planning to use Selectricity to allow viewers to vote for their preferences among a selection of music videos to be presented in a new program that will be airing in the next few weeks. Details are still being worked out with the network, Hill says.

IMAGE / SELECTRICITY

OBITUARIES

Joseph Weizenbaum, professor emeritus of computer science, 85

Joseph Weizenbaum, professor emeritus of computer science at MIT who grew skeptical of artificial intelligence after creating a program that made many users feel like they were speaking with an empathic psychologist, died March 5 in Berlin. He was 85.

Weizenbaum, who was Jewish, fled Nazi Germany with his parents and arrived in the United States in the mid-1930s. At the beginning of his career with computers, in the early 1950s, he worked on analog computers; later, he helped design and build a digital computer at Wayne University in Detroit, Mich.

In 1955, Weizenbaum became a member of the General Electric team that designed and built the first computer system dedicated to banking operations. Among his early technical contributions were the list processing system SLIP and the natural language understanding program ELIZA, which was an important development in artificial intelligence and cemented his role in the folklore of computer science research.

ELIZA was perhaps the first instance of what today is known as a chatterbot program. Specifically, the ELIZA program simulated a conversation between a patient and a psychotherapist by using a person's responses to shape the computer's replies. Weizenbaum was shocked to discover that many users were taking his program seriously and were opening their hearts to it. The experience prompted him to think philosophically about the implications of artificial intelligence, and, later, to become a critic of it.

Weizenbaum joined MIT's faculty in the 1960s. In 1976, he authored "Computer Power and Human Reason," in which he displayed ambivalence toward computer technology.

"'Computer Power and Human Reason' raised questions about the role of artificial intelligence, and spurred debate about the role of computer systems in decision making for many years," said Eric Grimson, head of the Department of Electrical Engineering and Computer Science at MIT.

Weizenbaum's more recent book, "Kurs auf den Eisberg," dealt with the difficult role of the scientist in an immoral world.

Weizenbaum held academic appointments at Harvard University's Graduate School of Education, Stanford University, the Technical University of Berlin and the University of Hamburg in Germany. He was a fellow of the American Association for the Advancement of Science, a member of the New York Academy of Science and of the European Academy of Science.

Miriam Yoffa Rich, longtime lab technician, 88

Miriam Yoffa Rich, who worked for 41 years as a laboratory technician at MIT, died Wednesday, Feb. 6. She was 88.

Born in Gardner, Mass., Rich was one of 11 children born to Pearl B. and Joseph Yoffa. She lived most recently in Venice, Fla.; before that she lived in Brookline, Mass.

Rich was employed at MIT for many years as a laboratory technician in the Department of Materials Science and Engineering, beginning in 1947 until her retirement in 1988. She was an American Red Cross volunteer for many years in Massachusetts. She was also a volunteer at the U.S. Public Health Service Hospital and the American Cancer Association.

She was a wonderful dancer, consummate bridge player, and an avid news follower. Her tremendous sense of humor and zest for life will be missed by all her friends and family.

Rich was the beloved wife of the deceased Kenneth B. Rich. She was the beloved aunt of seven surviving nieces and one nephew and many great- and great-great-nieces and nephews. She is also survived by two stepsons.

A service will be held at 11:45 a.m. on Sunday, April 6, at Sharon Memorial Park in Sharon, Mass.

AWARDS AND HONORS

The MIT Sea Grant College Program has selected two MIT faculty as recipients of the 2008 Doherty Professorship in Ocean Utilization. Franz Hover, assistant professor in the Department of Mechanical Engineering, and Eric Alm, assistant professor with appointments in the Department of Biological Engineering and the Department of Civil and Environmental Engineering, will each receive a supplemental award of $25,000 per year for two years.

The Doherty Fellowship encourages promising, nontenured professors to undertake marine-related research that will further innovative uses of the ocean's resources. The area of research may address any aspect of marine use and/or management, whether social, political, environmental or technological.

Hover's research with autonomous underwater vehicles (AUVs) will focus on developing and demonstrating a manipulation system for unknown environments; Alm will be studying genetic diversity in ocean bacteria.

Joseph M. Sussman, the JR East Professor in the Department of Civil and Environmental Engineering and the Engineering Systems Division, has been named chair of the federal Intelligent Transportation System (ITS) Advisory Committee.

The ITS, under the auspices of the U.S. Department of Transportation's Research and Innovative Technology Administration, advises the U.S. Secretary of Transportation on the study, development and implementation of "intelligent" transportation systems.

Alejandro N. Flores, a PhD student in the Department of Civil and Environmental Engineering, won the Outstanding Student Paper Award of the American Geophysical Union's Hydrology section.

The paper, co-authored with Professors Rafael Bras and Dara Entekhabi, is titled, "Modeling Uncertainty and Correlation in Soil Properties Using Restricted Pairing and Implications for Ensemble-Based Hillslope-Scale Soil Moisture and Temperature Estimation." Flores presented it at the AGU's meeting in September 2007.

School of Engineering Dean Subra Suresh, DMSE Department Head Ned Thomas and Professor Carl Thompson have been named among the 34 chosen as the inaugural class of fellows for the Materials Research Society.

Jimmy Bartolotta, an MIT junior, has been named to the 2008 "ESPN The Magazine" Academic All-America First Team in men's basketball.

Bartolotta was the only junior selected to the college division first team. A native of Littleton, Colo., Bartolotta maintains a converted 3.79 grade-point average while majoring in management science and physics. He also averaged an Institute-record 23.9 points per game this season.

An MIT undergraduate and two graduate students studying in the Harvard-MIT Health Sciences and Technology program were recently named fellows in the Paul & Daisy Soros Fellowship program—which recognizes students who are immigrants or children of immigrants.

MIT undergraduate Sudeb Dalai; and Robert Koffie and Vijay Yanamadala, both in the Harvard-MIT program, have each received up to $16,000 a year for their tuition, and $20,000 maintenance grants. Each award lasts two years.

Research by Moshe Ben-Akiva, the Edmund K. Turner Professor of Civil and Environmental Engineering, was featured in an episode of The History Channel's "Modern Marvels," which aired Thursday, Feb. 28.

The episode, titled "Superhighways," also featured a short interview with MIT alumnus Ramachandran Balakrishna PhD '06 describing the traffic modeling program, MITSIM.

MITSIM simulates traffic the way drivers experience it—cars following each other, changing lanes, braking when the car in front slows down—and models the drivers' responses in real time.

HOW TO REACH US
News Office
Telephone: 617-253-2700
E-mail: newsoffice@mit.edu
web.mit.edu/newsoffice

Office of the Arts
web.mit.edu/arts

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Editor
Greg Frost

Photojournalist
Donna Coveney

Production
Patrick Gillooly

News Office Staff
Writer .... David Chandler
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EUREKA!
Breakthrough tales at MIT

Shell shock

Sarah H. Wright
News Office

An MIT materials scientist's research on sea snails has helped transform battery technology and may end the era when cell phones die if they're dropped and PDAs must be replaced if they get dunked in the tub.

Thanks to those sea snails and a eureka moment, Angela Belcher, Germeshausen Professor of Materials Science and Engineering and Biological Engineering, is developing smart nanomaterials—hybrids of organic and inorganic components—beginning with a rechargeable, biologically based battery that looks like plastic food wrap.

Belcher's eureka moment occurred 10 years ago; it arose from her long, delighted fascination with abalone, the sea snail, and from her willingness to ask a wide-open question: "What if?"

Holding up an abalone shell before a visitor, Belcher describes the moment when the two threads—persistent interest and sudden insight—came together, forming the basis of her current research, which spans inorganic chemistry, materials chemistry, biochemistry, molecular biology and electrical engineering.

A seventh-generation Texan, Belcher began studying abalone when she entered the University of California, Santa Barbara, as a graduate student (abalone cling to California's coastal rocks). Intrigued since childhood by pearls and pearl-making mollusks, she was impressed by the abalone's shell: It's 98 percent calcium carbonate—what we call chalk, only 3,000 times stronger.

"The abalone makes this amazing material out of a common mineral," she says.

As a doctoral student at Santa Barbara, Belcher had an office with an ocean view. Working on her dissertation, a study of how the abalone produces both its rough outer shell and its opalescent interior simultaneously, she could see whales and dolphins in the Pacific.

On the wall opposite her desk hung a huge periodic table.

"Suddenly, I wondered, what if we could assemble materials like the abalone does—but not be limited to one element? What if we could bond protein to other elements in the periodic table and grow new materials?" she says.

Belcher recalls she stood on her desk to get closer to the chart of 110 elements, and that she felt like running down the hall in excitement.

"It seemed so logical and easy. Shells had been self-assembling, manufacturing amazing materials for 500 million years," she says.

Belcher received her PhD in 1997 and came to MIT in 2002. She won a MacArthur "Genius" award in 2004 and was named Researcher of the Year by Scientific American in 2006.

Her eureka moment has launched a new chapter in bioengineering; it has led to the development of smart new nanomaterials, essential to advances in optics and electronics.

With MIT colleagues Paula Hammond, Bayer Professor of Chemical Engineering, and Yet-Ming Chiang, professor of materials science and engineering, Belcher grew the first biologically based, nanoscale rechargeable battery—the one that may end short-lived cell phones.

Belcher's MIT battery is comprised of a virus she and her colleagues engineered to latch itself to cobalt oxide. It does look like a clear film. Transparent, efficient, it could one day be poured onto the object it's powering, like a coat of energizing paint.

Fabricating viral films, Belcher says, may provide new pathways for organizing molecules to help create electronic, optical and magnetic materials.

And she keeps studying the ancient abalone for clues to those new pathways. She keeps a cache of abalone shells on her MIT desk.

"It builds exquisite materials. It's a very nice animal," vegetarian Belcher notes, offering a shell to a guest.

In her research, Belcher is careful to avoid harming or killing her subjects, who live in abalone condominiums. To get samples of their secretions to study, she inserts glass slides beneath their shells, rather than endanger them.

Belcher still enjoys heady moments like the one in her ocean-front office, when delight makes her feel like running down the hall outside her lab in Building 16.

But her work at MIT is driven by a different question than the one that arose when she stood on her desk, scanning the periodic table, abalone shell in hand.

"Back then, I asked, 'What if? Wouldn't it be interesting if?'" she says. "Now, the questions are more like, 'What's the most efficient, useful material we could make?'"

Ultra-tiny computer chips, fuel cells, "smart" nanocrystal sensors—anything is possible with hybrid materials, she says.

"Abalone shells are self-assembling. What if we could make a material that is self-reassembling? What if iPods and Blackberrys could genetically mend their own cracks? These devices get dropped; they break; what material can we make so they fix themselves?"

Eureka is a column that aims to show how real-life experiences outside the lab can inspire breakthroughs in research or new directions in academic thought. If you've had or know of an MIT "Eureka" example, please e-mail shwright@mit.edu.

PHOTO / DONNA COVENEY

Germeshausen Professor of Material Science and Engineering and Biological Engineering Angela Belcher's interest in abalone helped transform battery technology.

TUITION

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Hastings. "Second, MIT meets the full demonstrated financial need of all students we admit. Third, we award all our aid based on need alone; MIT does not award any academic, athletic or other forms of merit scholarships."

Building on this commitment, MIT will increase its financial aid budget to $74 million. MIT's total financial aid budget is one of the highest per enrolled student in the nation. Sixty percent of MIT undergraduates receive scholarship aid from the Institute's internal resources. Fully 90 percent of MIT undergraduates receive financial aid of some kind, from a range of sources. While MIT focuses assistance on those with fewer resources, it also provides aid to families with incomes well above $100,000 who demonstrate need—for example, because they have more than one child in college at a time. In fact, approximately 38 percent of current MIT scholarship recipients come from families earning more than $100,000.

Tuition and fees for the upcoming academic year will increase 4 percent to $36,390; however, this figure represents less than half of what it costs MIT to educate an undergraduate. As Hastings noted, "In a pattern MIT has followed for many years, we are increasing funds available for financial aid this year at a far greater rate than the rise in tuition." During the past decade, the net tuition for undergraduates—what students and families pay after financial aid—has, on average, dropped by more than 15 percent when adjusted for inflation.

"For those receiving an MIT scholarship, which is six out of every 10 MIT undergraduates, net tuition is $8,100—an amount that approximates the in-state cost of many public universities," Hastings added.

MIT has long taken an aggressive position on aid because its students demonstrate a much higher level of need than students at peer institutions. More than 22 percent of MIT undergraduates come from families with annual incomes less than $60,000 a year; 17 percent come from families with incomes under $45,000.

Two years ago, the Institute took a leadership role in the national debate on financial aid when it became the first private university to match federal Pell Grants, dollar for dollar, effectively doubling this federal grant for the neediest students. Approximately 14 percent of MIT undergraduates receive a Pell Grant, the largest federal grant program for undergraduate education.

"We will continue our longstanding financial commitment to students and their families in the years ahead," Hastings said. "That we can welcome to our campus such extraordinary students, regardless of their economic background, is due to our historic dedication to need-based financial aid."

PHOTO / ROMAN STOCKER

A microfluidics device on the microscope

MEALTIME

Continued from Page 1

material and sealed with a glass slide. The researchers injected bacteria and nutrients into the microchannels at specific locations and, using video-microscopy, recorded the bacteria as they foraged on two simulated food sources: a lysing algal cell that creates a sudden explosion of dissolved nutrients and the small nutrient plume trailing behind particles that sink in the ocean.

The question of whether the bacteria could or couldn't put their swimming skills to use in this race against time has generated considerable interest in the scientific community over the past decade, because there's a great deal riding on P. haloplanktis' and its relatives' ability to reach these nutrients and recycle them for other animals in the food web.

Scientists who study Earth's carbon cycle know that accounting for all the organic matter in the marine food web is critical, including the matter that exists in these tiny, discrete nutrient patches bacteria feed on. In fact, the carbon in those patches is so important that some scientists believe marine bacteria's capacity to utilize it will determine whether the oceans become a carbon sink or source during global warming.

Until 25 years ago, scientists weren't really aware of the microbial loop, the processing of organic material among the smallest creatures in the ocean: bacteria, phytoplankton, nanozooplankton, viruses, etc. Now they know that the roughly one million bacteria per milliliter of ocean play a pivotal role in the microbial loop; by recycling that organic matter, they pass it on to larger animals and prevent it from dropping out of the marine food web.

But quantifying the importance of bacteria in the microbial loop has been difficult, because creating a realistic microenvironment wasn't possible until recently.

"You can hope to study an organism's behavior only in the context of its environment. The habitat of a bacterium, on the other hand, is extremely small, on the order of microns to millimeters," said Stocker. "This has made the study of microbial behavior a formidable technical challenge to date. We have been able to create realistic environmental landscapes for studying marine bacteria in the lab by using microfluidic technology."

P. haloplanktis is a rapid swimmer, propelling itself by a single rotating flagellum in bursts of speed up to 500 body lengths per second (the fastest land animal, the cheetah, travels at bursts of speed up to 30 body lengths per second). During experiments, Stocker and team observed that the bacteria used their rapid motility very effectively to swim toward and follow their food sources. That directed movement in response to a chemical gradient (in this case, nutrients) is known as chemotaxis.

"It will be important to see how widespread the use of rapid chemotaxis is in the ocean," said Stocker. "We expect this to depend on the environment; in algal blooms, for example, nutrient patches and plumes will be abundant, and speedy bacteria will be favored. Whenever this is the case, nutrients get recycled much more rapidly, making the food web more productive and potentially affecting the rates at which carbon is cycled in the ocean."

The National Science Foundation, the Department of Energy's Genomes to Life Program, the Woods Hole Center for Ocean and Human Health, and the Gordon and Betty Moore Foundation funded this research.

Interview with the dean: Subra Suresh, School of Engineering

Over the course of the spring semester, Tech Talk will be bringing readers a series of interviews with each of MIT's five school deans. The second in this series features De (DMSE) who took charge of the School of Engineering last summer. In the following interview with Greg Frost and David Chandler of the MIT News Office, Suresh outlines h both at MIT and globally.

Q. It's admittedly early in your tenure, but can you give us a sense of your top short- and long-term goals?

A. The School of Engineering at MIT has been perceived both nationally and internationally as the leading engineering school. The long-term goal would be not only to maintain that lead in the face of ever-increasing competition, but also to enhance significantly the gap between us and peer institutions that compete with us. In the face of changing intellectual climate of engineering on a global scale, we must make sure that the next wave of engineering inventions and innovations—by that I mean the way engineering is taught in academic institutions for both graduate and undergraduate students and the way engineering innovations impact industrial practice and society—nucleates here. For example, engineering science was a concept that started in MIT's School of Engineering, and now it is followed all over the world. The goal is to provide opportunities that enhance excellence in education, research and innovation.

As a leading engineering school, I would say that we have not only an opportunity but also an obligation and a responsibility to lead the profession.

> "As a leading engineering school ... we have not only an opportunity but also an obligation and a responsibility to lead the profession.
>
> Subra Suresh

The pace of intellectual change in engineering has been very rapid, and multidisciplinary view of education and research has grown significantly within the past decade. Historically, engineering has emerged from the intellectual foundations of physics, chemistry and mathematics. But more recently biology has become an important part of that intellectual core. Economics, management and humanities, as well as communication skills, engineering ethics and teamwork have also become important flavors of that core. We must continually ask if we are preparing our students the right way.

Any faculty member at MIT has the opportunity to work across departmental boundaries within the school and across school boundaries within the Institute as far as multidisciplinary research is concerned. We must ensure that administrative and organizational barriers are minimized or eliminated to develop educational and intellectual activities across schools. The time constant for organizational change in academia is much longer than the time constant for the evolution of a new intellectual discipline. One of the key things that we are focusing on is how to make the intraschool and interschool organizational structures more nimble. For example, with respect to teaching, is there duplication of subjects? With respect to research, with respect to recruitment of junior faculty whose research interest may lie in more than one department, we want to make it easier to work effectively across organizational silos. We know that there are growing numbers of faculty who join MIT with more than one academic field of interest, and with activities in more than one department. So this is going to be a very challenging task, but a very important task for us to examine and refine.

Given the blurring of disciplinary boundaries, we need to develop a system that continues to attract the best faculty and students. How do we continually improve our best practices to mentor them, to nurture them, and to provide a supporting environment for their intellectual growth? This is also a strong focus of our strategic planning process.

Are there novel mechanisms through which we should be thinking about providing our students the opportunity for a broad education without necessarily sacrificing depth? In addition to well-established fields of specialization—as, for example, mechanical engineering, electrical engineering, computer science—should we explore the possibility of a broader engineering degree for those who would use it as a foundation to launch a career in a different field? What would be the intellectual content of such an MIT engineering degree? Would such a broad first degree in engineering enhance the appeal of science and engineering in society?

A second near-term and very important goal is to significantly increase the proportion of women and underrepresented minority groups in faculty and student ranks.

A third item is that individual faculty members at MIT in general, and at the School of Engineering in particular, have been extremely successful in engaging globally in educational and research activities. There are a few examples where MIT has centrally created opportunities for faculty and students. So one of the things we've started to do for the near term is to develop a strategic plan for the school, with respect to international and global engagement. We have a faculty director of international programs for the school who is working very closely with the Institute committees to chart the course for international engagement in a coordinated manner.

The fourth major goal is to enhance opportunities to translate successes from scientific discoveries to practice so that the greatest benefits to society are realized as quickly as possible. MIT and the School of Engineering have done remarkably well in creating an ecosystem to translate fundamental research into practice. One recent initiative we have put in place involves internationalization of the best practices of the Deshpande Center. This is a program, known as I-cubed, International Innovation Initiative, that we launched several months ago. This is expected to create new opportunities for MIT faculty to translate research into practice on a global scale by bringing the best practices of the Deshpande Center in our international collaborations.

Q. Within the broad range of engineering disciplines, are there particular areas MIT needs to increase its emphasis? At the same time, are there areas that are important now but may be less so in coming years?

A. Broadly, there are areas within engineering that play a major role in interdisciplinary activities at the Institute. For example, the MIT Energy Initiative. In the latest round of seed funding, approximately 70 percent of the seed funding went to the School of Engineering—not by design; that's just how it evolved. That's very important because we have a lot of strength in not only fundamental research but also in applying the fundamental research to practice, and energy and environmental sustainability are two major areas of intellectual pursuit with significant implications for the global society. In fact, I was very pleased to see the Schools of Engineering and Science partner with the MIT Energy Initiative in the first round of seed funding for research into energy. We also jointly supported the creation of several broad subjects on energy taught across our two schools.

School of Engineering Dean Subra Suresh discusses the future of engineering, both at MIT and around t

I don't think we can separate the environment from the energy discussion. More than 12 faculty members from the School of Engineering are participating in a new program with research activities in the areas of water, environment and sensing technology. This is the CENSAM Program, a research component of the Singapore-MIT Alliance for Research and Technology Centre (or SMART Centre).

A third important area for us lies at the intersection of engineering and life sciences. There are a number of activities there where the School of Engineering plays an active role—I will mention four of them. The first is that the Koch Institute for Integrative Cancer Research was launched recent-

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ean Subra Suresh, a former head of the Department of Materials Science and Engineering
his hopes and dreams for the School of Engineering and the changing face of engineering

PHOTO / DONNA COVENEY

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ly, and the School of Engineering will have 12 faculty members set up their research laboratories in the new building for which groundbreaking ceremonies were held last week. The new Department of Biological Engineering came into existence last year, and the first batch of undergraduate students will receive their degrees this June. This department is redefining the intellectual landscape of intersections between quantitative engineering science and biology with implications for human health. A third example of this engagement is one of the large interdisciplinary research groups in the area of infectious disease. Just like CENSAM, there is an infectious disease program of the SMART Centre, through which a number of faculty members from the School of Engineering work closely with colleagues from biology and from our partner institutions abroad. There are four major diseases that are being studied: tuberculosis, avian flu, malaria and respiratory syncytial virus. These strategic global alliances give us a unique opportunity to undertake research beyond what can be done solely in Cambridge, Mass.

A final example is a virtual activity in microbiology that just started a new PhD program, that has roughly half of the faculty involved from biology and the School of Science, and the other half from several departments in the School of Engineering. We have supported that program with fellowships. It is my understanding that for next fall, there is a large number of applicants for that program. That brings me to another very important point and priority for the school to engage very actively with other schools, much more so than we've done in the past. The Dean of Science and I have been meeting almost once a week, ever since both of us became deans, to facilitate this inter-school interaction. We've also started expanding formal interactions and collaborations with other schools. So Dean Santos of the School of Architecture and Planning and I have been talking about priorities in such areas as transportation and energy, and about capturing and showcasing MIT's excellence in the arena of innovation and invention in a visible manner across the Institute. Working with the School of Architecture and the MIT Museum, we are exploring ways of highlighting the excitement of activities facilitated by the Deshpande Center, Lemelson-MIT Program, various student prize programs and I-cubed in various prominent locations across the institute. That's the mid-term goal. Similarly, the dean of the School of Humanities, Arts, and Social Sciences, Dean Fitzgerald, and I have plans for several interschool activities in new and emerging interdisciplinary areas, from the viewpoints of both teaching and research.

An example of a successful joint activity with the Sloan School of Management involves the joint executive education program offered for British Petroleum. We have BP Academy and BP Projects Academy, which are joint activities between Sloan and the School of Engineering, and we want to expand and enhance such activities in the coming year through our professional educational program. Another goal would be to engage with the Innovation Center and the Entrepreneurship Center of Sloan School with I-cubed in the School of Engineering. One other mid-term goal is to develop innovative mechanisms to engage a broader cross-section of faculty within the school in leadership roles in new and exciting initiatives. We have many wonderful, mid-career faculty, who have a lot of energy and very good ideas, and they really care about MIT. So in the last few months we've encouraged mid-career faculty to meet together and come up with ideas for innovative initiatives within the school, and we are exploring mechanisms to support these ideas.

SCHOOL OF ENGINEERING

BY THE NUMBERS

- '07-'08 undergraduate enrollment: 1,803
- '07-'08 graduate enrollment: 2,740
- '07-'08 faculty includes 255 professors, 71 associate professors and 46 assistant professors

Q. What is the most surprising thing you've run across thus far in your leadership of the School of Engineering?

A. I've been a student at MIT. I've been a faculty member at MIT for 15 years. I'm also an MIT parent. I've looked at MIT from very different angles, and I was also a professor at another institution for 10 years before returning to MIT. The excellence of the School of Engineering is not a surprise to me. But the breadth and depth of that excellence—seeing it from this office—has been a very pleasant surprise. I've seen it on all levels, from the senior-most to the junior-most faculty member, among undergraduate and graduate students, and among technical and support staff.

> In an increasingly virtual, software-controlled world, the real hardcore, hands-on experience should not be overlooked.
>
> Subra Suresh

Q. What do you see in the future in terms of the degree to which engineering education involves real hands-on work—actually building things or working in a lab as opposed to sitting at a computer screen?

A. A few months ago, we established a new program in the school called the Bernard Gordon Program for Educational Leadership with a $20 million commitment for support from MIT alumnus Bernie Gordon over a 10-year period. And the purpose of the program is exactly what you just mentioned, which is to provide our undergraduate students an opportunity for much greater hands-on experience, for learning through teamwork and for leadership training. In an increasingly virtual, software-controlled world, the real hardcore, hands-on experience in engineering should not be overlooked, and one of the purposes of this program is to create much greater opportunities for our students to experiment, explore and to learn by working with real systems and components. The challenge there is the scale. I mean, having a lab for a thousand students is not that easy, but we want every undergraduate student to have that experience some day.

Q. As a follow-up question, is MIT doing this because it worries that incoming students aren't as comfortable doing the kind of hands-on work as, say, previous generations of MIT students?

A. Great question. EECS has done this for their freshmen, but there are also other examples of this. About eight years ago, the Department of Aeronautics and Astronautics revamped its undergraduate curriculum. So they have a unified undergraduate curriculum that combines learning with practical experience through experimentation, design and teamwork. The other example is in the Department of Materials Science and Engineering, where we built modern undergraduate teaching labs along the Infinite Corridor. In the sophomore year, we have a curriculum now where the students not only take lectures but also work in coordinated labs. That meant creating new labs that did not exist and also required that we change our teaching assignment. Across many departments in the school, colleagues feel that such experiences are very important in undergraduate education.

There is a broad sentiment across the school that we cannot get away from real hands-on experience for engineering education. It requires a lot of resources, so I think it needs to be done carefully.

Q. Looking ahead, how important do you see engineering education being to a country's competitiveness in an increasingly interconnected world?

A. This is going to be the century of technology, more so than the previous century. The engineers trained by institutions such as MIT will not only have many more career changes than their parents or grandparents did, but they are also likely to live and work abroad more frequently than the previous generations of engineers did. I believe that it is extremely important for MIT's School of Engineering to help train outstanding engineers and global citizens whose technological prowess and leadership skills helps solve complex global problems. Such engineers, scientists, technologists and innovators will hold the key to our country's competitive edge in an increasingly interconnected global economy. Major American corporations such as IBM, General Electric, Microsoft or Google have large research centers abroad in places like Bangalore and Shanghai. As an intellectual leader, knowledge creator and educational and research innovator, the School of Engineering at MIT is a key player in this global engineering enterprise. As greater numbers of engineers are produced in rapidly growing economies with large populations, role models such as MIT's School of Engineering are also very much sought after for advice and input, and for developing high standards that the international community can be proud of.

PHOTO / WILLIAM LITANT

Flight out of the past

Senior Technical Instructor Dick Perdichizzi prepares a life-size model of a prehistoric four-winged bird-like creature for testing in Aero-Astro's Wright Brothers Wind Tunnel. The model is conjectured on fossils discovered in China. Aerodynamicists and paleontologists from the United States and China, along with a crew from the PBS 'Nova' program, descended on the MIT facility last summer, experimenting with the articulated model to see if and how it might have flown. The resulting program, 'The Four-Winged Dinosaur,' first aired Feb. 26.

On a 'roll': MIT researchers devise new cell-sorting system

Process could yield low-cost tool for diagnosing cancer, other diseases

David Chandler
News Office

> Nobody has ever done anything like this before.
>
> Rohit Karnik, assistant professor of mechanical engineering

Capitalizing on a cell's ability to roll along a surface, MIT researchers have developed a simple, inexpensive system to sort different kinds of cells—a process that could result in low-cost tools to test for diseases such as cancer, even in remote locations.

Rohit Karnik, an MIT assistant professor of mechanical engineering and lead author of a paper on the new finding appearing last week in the journal Nano Letters, said the cell-sorting method was minimally invasive and highly innovative.

"It's a new discovery," he said. "Nobody has ever done anything like this before."

The method relies on the way cells sometimes interact with a surface (such as the wall of a blood vessel) by rolling along it. In the new device, a surface is coated with lines of a material that interacts with the cells, making it seem sticky to specific types of cells. The sticky lines are oriented diagonally to the flow of cell-containing fluid passing over the surface, so as certain kinds of cells respond to the coating they are nudged to one side, allowing them to be separated out.

Cancer cells, for example, can be separated from normal cells by this method, which could ultimately lead to a simple device for cancer screening. Stem cells also exhibit the same kind of selective response, so such devices could eventually be used in research labs to concentrate these cells for further study.

Normally, it takes an array of lab equipment and several separate steps to achieve this kind of separation of cells. This can make such methods impractical for widespread screening of blood samples in the field, especially in remote areas. "Our system is tailor-made for analysis of blood," Karnik said. In addition, some kinds of cells, including stem cells, are very sensitive to external conditions, so this system could allow them to be concentrated with much less damage than with conventional multi-stage lab techniques.

"If you're out in the field and you want to diagnose something, you don't want to have to do several steps," Karnik said. With the new system, "you can sort cells in a very simple way, without processing."

Now that the basic principle has been harnessed in the lab, Karnik estimates it may take up to two years to develop into a standard device that could be used for laboratory research purposes. Because of the need for extensive testing, development of a device for clinical use could take between five and 10 years, he estimated.

The work was a collaboration between Karnik and six other researchers: MIT Institute Professor Robert Langer, Jeffrey Karp of the Harvard-MIT Division of Health Sciences and Technology, Seungpyo Hong, Ying Mei and Huanan Zhang of MIT's Department of Chemical Engineering, and Daniel Anderson of the Center for Cancer Research.

The work was funded by a grant from the National Institutes of Health.

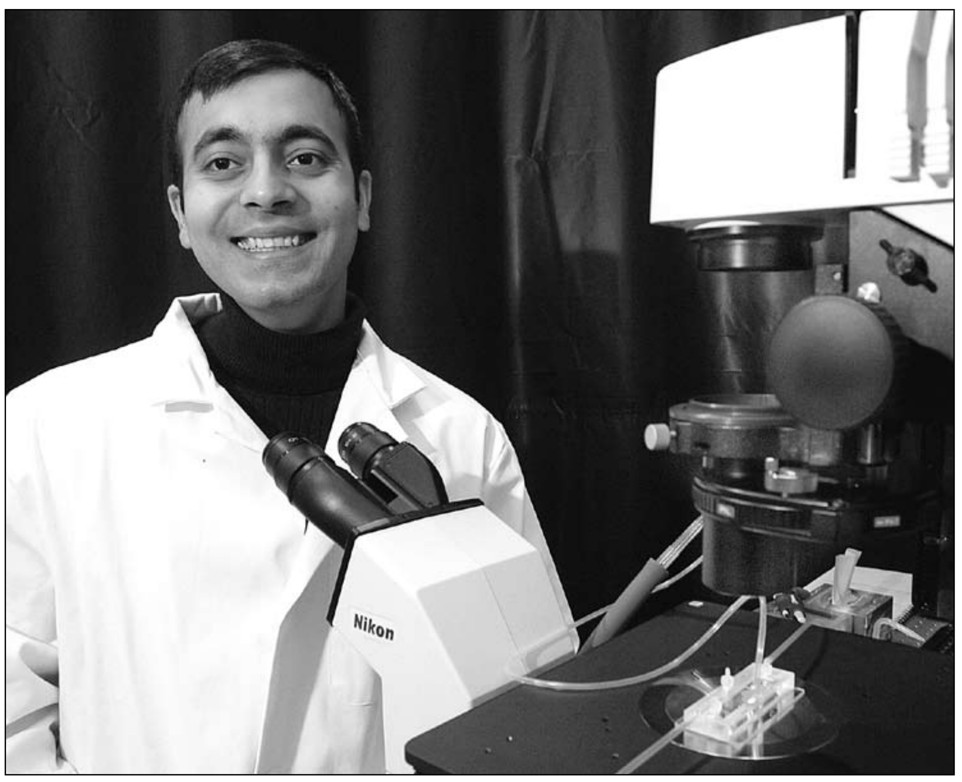

PHOTO / DONNA COVENEY

Professor Rohit Karnik works in the lab with the new method for cell separation that he, Institute Professor Robert Langer and other colleagues have developed. It involves steering rolling cells and could lead to devices for rapidly detecting diseases.

Science journalism: bright future ahead

David Chandler
News Office

"There's never been a better time to become a journalist," declared Dianne Lynch, dean of the Park School of Communications at Ithaca College, in her talk at a two-day MIT Knight Science Journalism Fellowships symposium held Feb. 18-20 on the future of science journalism.

Some people might have thought otherwise, given the spate of reports recently about the falling circulation and revenues of newspapers and the resulting staff layoffs and buyouts. But those problems have nothing to do with journalism itself, Lynch said, but only with "the demise of a business model" that's based on "an outdated delivery system."

The news business is changing fast, but it's not going away. In fact, more people than ever are reading about science and technology, but just doing it in different ways—for the most part, online instead of in traditional, printed newspapers, Lynch explained.

The symposium, held to celebrate the 25th anniversary of the MIT fellowship program that has become the leading professional program for mid-career science journalists, drew 192 ex-Knight fellows (or Bush fellows, as the program was known in its initial years) and other journalists from around the country and several other nations.

The event also marked another milestone, the impending retirement of the program's director, Boyce Rensberger, after 10 years. He will be replaced in June by Philip Hilts, who teaches science journalism at Boston University. The program was founded by Victor McElheny in 1983.

MIT President Susan Hockfield opened the meeting by stressing the importance of good science communications in this era when people are constantly faced with increasingly complex scientific and technical issues. "We need to help the public make decisions based on fact, not fear," she said. "Without incisive, nuanced writing, we at MIT might as well fold up our solar collectors and go home."

The role of journalists is changing in this evolving media landscape, said Tom Rosenstiel, director of the Project for Excellence in Journalism. While their role has often been described as that of gatekeepers, the more appropriate role is now that of authenticator—helping readers figure out, from the vast array of sources of information now available, what can be believed and trusted and "where the good stuff is." Comparing science to sports, he said the journalist's role is evolving from that of color commentator to being a referee on the field.

But as much as the means of distribution may change and business models may need to shift accordingly, people's interest in reading authoritative reporting has not diminished, Rosenstiel said. "The problem is not a demand problem," he said. For example, "more people actually read what comes out of The New York Times newsroom" than ever before. Although we are now in a period of transition in terms of how people receive their news and information, "things will work out," he predicted. "There's a golden age of science journalism ahead."

PHOTO / DONNA COVENEY

The MacVicar teachings awards were announced and celebrated at a gathering at Gray House on Friday evening. Gathered to celebrate were, from left, Dean for Undergraduate Education Daniel E. Hastings; Provost Raphael L.. Reif; Sanjay E. Sarma, associate professor of mechanical engineering; Tania Baker, professor of biology; President Susan Hockfield; Barton Zwiebach, professor of physics; Stephen James Tapscott, professor of literature; and W. Craig Carter, professor in the Department of Materials Science and Engineering.

Wieman: To lecture is human, to engage divine

Alumnus and Nobel winner leads celebration of MacVicar Day

Deborah Halber
News Office Correspondent

As a young professor, Carl E. Wieman SB '73 figured it would be easy to get his students as excited about physics as he was. He would simply explain the subject, and students would see it with the same sterling clarity he did.

It didn't work.

"For many years, it was a frustrating puzzle to me" that students left the classroom as baffled—sometimes more baffled—than when they came in, said Wieman, a 2001 recipient of the Nobel Prize in Physics for his work on Bose-Einstein condensation.

As part of MacVicar Day 2008, an annual MIT celebration of undergraduate education, Wieman spoke March 7 about "Science Education in the 21st Century: Using the Tools of Science to Teach Science."

Spending less time reciting textbook facts, and more time actively engaging students with the same kind of puzzles and challenges that intrigue experts, goes a long way toward boosting student motivation and achievement, Wieman said. "Lectures listened to passively are completely worthless," he said. "They'll probably get the material better reading the text on their own. Use classroom time for making sure students are prepared to learn, for processing concepts and deeper understanding."

This year's MacVicar Faculty Fellows, announced at a reception hosted by President Susan Hockfield following Wieman's talk, are Tania Baker, professor of biology; W. Craig Carter, professor of materials science and engineering; Sanjay E. Sarma, associate professor of mechanical engineering; Stephen J. Tapscott, professor of literature; and Barton Zwiebach, professor of physics.

Wieman, who founded and directs the Carl Wieman Science Education Initiative at the University of British Columbia (http://www.cwsei.ubc.ca), said that "enormous global-scale issues," such as global warming, require a scientifically literate population. Yet science educators are failing to turn out students—aside from the 1 percent who go on to scientific careers—capable of "thinking about and using science like a scientist," he said.

Wieman's undergraduate experience at MIT was unorthodox: he pursued his own research in Lester Wolf Professor Daniel Kleppner's group and "spent countless hours" discussing physics with graduate students and postdocs, including David E. Pritchard, now Cecil and Ida Green Professor of Physics, but managed to take few formal classes.

It was when Wieman first starting teaching physics at the University of Michigan and later at the University of Colorado that he realized that something was going wrong for undergraduate science students. At the same time, students who entered physics graduate programs were miraculously transformed—from largely the same launching point as their nonscience classmates—into expert physicists.

How did this happen? Wieman started looking to the increasing body of classroom-based studies, brain function investigation and cognitive psychology research for an answer.

He found that a dismal retention rate—only 10 percent of students correctly recalled a nonobvious fact 15 minutes after they heard it in a lecture—was "exactly what you would expect," he said. Because our short-term memory is very limited, it's not surprising to brain researchers that most students have only "a vague sense" of what a lecture was about immediately after hearing it.

Within the context of brain research, the inability of students to change their mode of thinking from novice to expert also was not surprising, he said. Becoming an expert changes the brain physically to include an organizational structure that allows retrieval and deployment of knowledge; simply delivering expert knowledge to students does not make them experts.

Wieman found that graduate students, by working with an expert tutor, learn by developing their own understanding. An expert individual tutor can have a large impact on even large lecture classes by focusing on motivation, he said. "The goal is to convince students that physics is important and fascinating; probe where they are starting from, get them to actively process ideas and then probe and guide their thinking," he said. Posing questions instead of imparting information; getting students to explain material to the professor and to each other; and allowing students to make mistakes and correct them on their own all result in dramatic improvements in retention and conceptual understanding, he said.

Technology such as personal response clickers can enhance engagement and provide instant feedback on what students do and don't understand.

"You can't assume they're interested in (the subject matter), but if you can make them interested in it, they'll learn it a lot better," he said. "Think about every question you pose: Is it obvious why someone would care about that answer besides a physics professor posing it on a test?"

CLASSIFIED ADS

Members of the MIT community may submit one ad each issue. Ads should be 30 words maximum; they will be edited. Submit by e-mail to ttads@mit.edu or mail to Classifieds, Rm 11-400. Deadline is noon Wednesday the week before publication.

FOR SALE

Yamaha Motif ES8 music production synthesizer for sale, like new – not used. $1,800 or BO. Contact 978-263-4420 or kushkuley@gmail.com.

DIGITALK: Where IT's at

A flair for computer repairs

IS&T's Walk-In Help and Service Center in Building N42 handles computer repairs, consulting and troubleshooting. With cross-trained staff and a simplified pricing structure, this single "front door" at 211 Massachusetts Ave. makes it easy for community members to get expert diagnosis and help. You don't need to know whether your computer problems are caused by a hardware malfunction, corrupted operating system, virus—or a combination of factors.

Call the Computing Help Desk at 617-253-1101 to talk to a consultant before bringing your computer to N42. Depending on the nature of the problem, this phone call may save you the trip. If not, you can make an appointment for an in-person consultation or a drop-off. There is no charge for the first 15 to 30 minutes you spend with a consultant. If the problem has not been resolved in that time, you can choose to leave your machine for repair. At this point, you will be charged $60 an hour for any software repair or nonwarranty hardware repair plus the cost of any parts. There is no charge for work on hardware under warranty.

For more information, see http://web.mit.edu/ist/helpdesk.

MIT GeoWeb

MIT GeoWeb, a new interface to the MIT Geodata Repository, enables users to access Geographic Information Systems (GIS) data, once accessible only in ArcGIS, through a standard web browser.

The web interface lets users search, view and download GIS data and metadata from the MIT Geodata Repository, an international collection of GIS data maintained by MIT GIS Services, which is jointly sponsored by the MIT Libraries, IS&T and the Office of Educational Innovation and Technology. Users will find data in the MIT system not freely available on the web or in Google Earth, and can download, manipulate and analyze data in whatever system they choose. MIT certificates are required for access. To learn more and see a video tutorial, go to http://web.mit.edu/geoweb.

Options for unwanted cell phones

Many options are available for reuse or disposal of cell phones that are old or that you no longer need. If your phone is from one of MIT's preferred vendors—Sprint/Nextel or Verizon Wireless—find out if anyone else in your department can use a cell phone from that vendor. If so, you can have your phone number removed from the device and the service provider can assign a new one. If you don't find a taker, your administrative officer may want to keep the deactivated phone to serve as a backup for a lost or broken phone, or to give to a staff member in the future.

If you can't identify a business need for your unwanted cell phone, consider donating it. There are several donation programs that are linked to charities, or which recycle mobile devices in an environmentally responsible way. To learn about these programs, go to http://web.mit.edu/ist/topics/telecommunications/disposal.html.

New phone and network proxy charges

Beginning in fiscal year 2008, most telephone and network services at MIT are being billed on a new proxy pricing methodology. Departments, labs and centers (DLCs) are no longer receiving individual charges for IP addresses, analog or ISDN telephones, long-distance and international calling and Tether.

Instead, IS&T and the Office of Budget Operations now determine a DLC's cost for these services based on a proxy count of full-time employees multiplied by the rate per proxy. To ensure that no DLC is adversely affected by the change in pricing methodology, the Office of Budget Operations is working with the assistant deans in each school to make budget adjustments as needed.

The annual proxy rate for FY08 is $1,275. This rate includes a 10 percent price increase, which DLCs are expected to absorb. Telephone and network rates have not increased since fiscal year 2004 and, in fact, decreased by 15 percent in fiscal year 2006, despite significant increases in infrastructure-related costs during this time.

If you have questions about the new telephone and network rates, contact Angie Milonas at milonas@mit.edu or John Donnelly at jdonnely@mit.edu.

Digitalk is compiled by Information Services & Technology.

IMAGE / ELLENZWEIG ARCHITECTURE | PLANNING

An artist's rendering of the new David H. Koch Institute for Integrative Cancer Research at MIT, as it would be seen at dusk.

Groundbreaking research

MIT kicks off construction of the new Koch Institute

Anne Trafton
News Office

MIT broke ground on Friday for the new David H. Koch Institute for Integrative Cancer Research, a facility that its director, Tyler Jacks, said will usher in "the next generation in cancer research."

The state-of-the-art institute, scheduled to open in December 2010, will house 25 laboratories occupied by MIT engineers, scientists and clinicians working together toward a common goal—creating better ways to detect, prevent and cure cancer.

"The challenges of cancer are immense, and the solution to the problem does not lie in a single field of study," Jacks said during the groundbreaking luncheon. "Only by working together can we prevail."

The institute will be largely funded by a $100 million donation from David H. Koch SB '62, SM '63. Koch, who was diagnosed with prostate cancer 16 years ago and given only a short time to live, said he became a "passionate crusader" for cancer research after beating the disease himself.

> This occasion is one I have long waited for.
>
> David H. Koch

"This occasion is one I have long waited for," Koch said Friday. "The synergy between these two groups (scientists and engineers) will be very powerful and accelerate the development of cures. I'm very hopeful that by the time my children grow up, such cures will be available."

Koch, who received a standing ovation after his remarks, said that having the cancer institute named for him is the greatest honor he has ever received. "This is a day I will always remember," he said.

The new institute will be built on the corner of Main and Ames streets, across from the Broad and Whitehead institutes. That location puts it directly in the center of the science and engineering nexus that includes not only Broad and Whitehead but MIT's departments of biological and chemical engineering, the Stata Center and Brain and Cognitive Sciences Complex, said MIT President Susan Hockfield.

"The kind of ideas being developed here ... could revolutionize the way we detect cancer, the way we treat it, and the steps we take to prevent this disease altogether," Hockfield said.

The Koch Institute will be equipped with the most sophisticated research tools currently available, including facilities for bioinformatics and computing, genomics, proteomics and flow cytometry, large-scale cell and animal facilities for genetic engineering and testing, advanced imaging equipment and nanomaterials characterization labs.

National Cancer Institute Director John Niederhuber said the new facility will set the "gold standard" for research on cancer and other diseases.

"This is not only an historic moment for MIT, but also for the nation's very important cancer center program," Niederhuber said. "What you are beginning today is a new era in how we approach and study the processes that lead to disease."

The new institute will replace and build on the work of MIT's Center for Cancer Research, which was established in 1974, shortly after the federal government declared a "war on cancer." Hockfield said that much progress has been made since then, but more is needed.

"This is a moment to invest in a decisive change," she said.

Several Cambridge city officials, including Mayor Denise Simmons, attended the groundbreaking. Simmons thanked MIT administrators and faculty for "stepping up to the plate" to fight cancer.

"We wait with bated breath to learn about your advancements," she said.

PHOTO / JUSTIN KNIGHT

From left, MIT President Susan Hockfield; David H. Koch; Cambridge Mayor Denise Simmons; Tyler Jacks, director of the Koch Institute; National Cancer Institute Director John Niederhuber; Provost L. Rafael Reif; Executive Vice President and Treasurer Theresa Stone; Vice President of Institution Affairs and Corporation Secretary Kirk Kolenbrander; Vice President of Research and Associate Provost Claude Canizares; School of Science Dean Mark Kastner; School of Engineering Dean Subra Suresh; and Corporation Chairman Dana G. Mead break ground on the new David H. Koch Institute for Integrative Cancer Research on March 7.

PHOTO / JUSTIN KNIGHT

From left, Koch Institute Director Tyler Jacks and David H. Koch listen during the groundbreaking ceremony.

Professors detail research pursuits

Dozens of journalists from national and international publications attended a special media briefing Thursday, March 6, in which several MIT faculty members discussed research they will pursue at the new Koch Institute for Integrative Cancer Research.

"Cancer remains a devastating problem and a major health issue, and we at MIT want to do something about it," Tyler Jacks, director of the Koch Institute, said in his opening remarks.

The daylong event at the Broad Institute featured discussions of topics such as why some cancer drugs fail, nanotechnology, cellular pathways in cancer cells and the immune system's response to cancer.

Robert Weinberg, professor of biology, explained current theories of how cancer spreads through the body, a process known as metastasis. Researchers believe that metastasis, which causes 90 percent of cancer deaths, occurs when cancer cells regain the embryonic ability to move through the body.

Sangeeta Bhatia, associate professor of health sciences and technology and electrical engineering and computer science, described efforts to build nanoscale devices that could detect, monitor and treat cancer.

Institute Professor Robert Langer discussed his laboratory's work on nanodevices, and Institute Professor Phillip Sharp described advances in RNA interference, which could be used to silence genes that cause cancer.

Other presenters were Frank Gertler, the Ross Scholar Professor of Biology; Michael Hemann, the Latham Family Career Development Assistant Professor of Biology; David Housman, the Ludwig Professor of Biology; Angela Belcher, the Germeshausen Professor of Materials Science and Engineering and Biological Engineering; Michael Cima, the Sumitomo Electric Industries Professor of Engineering; Nancy Hopkins, the Amgen, Inc. Professor of Biology; Jacqueline Lees, professor of biology and associate director of the Koch Institute; Forest White, the Mitsui Career Development Assistant Professor of Biological Engineering; Michael Yaffe, associate professor biology and biological engineering; Scott Manalis, associate professor of biological and mechanical engineering; Paula Hammond, the Bayer Chair Professor of Chemical Engineering; Darrell Irvine, the Eugene Bell Career Development Professor in Tissue Engineering; and Dane Wittrup, the Carbon P. Dubbs Professor of Chemical Engineering and Bioengineering and associate director of the Koch Institute.

— Anne Trafton