

Session examines how to use \$10M gift for education

■ By Robert J. Sales
News Office

President Charles M. Vest joined a select group of about 60 faculty members, students and senior officers last Friday in an intense brainstorming session on how to use a \$10 million gift from Alex and Brit d'Arbeloff to support educational innovation at MIT.

The "charrette" session was divided into three one-hour segments at the Faculty Club. Charrette, the French word for cart, is used by architects to mean a fast, intensive design exercise. The usage developed because French architectural students were required to

drop design papers into a cart to be delivered to their professors.

Among the participants in the charrette were Chancellor Lawrence S. Bacow, Provost Robert A. Brown, Rebecca M. Vest, Dean of Students and Undergraduate Education Rosalind H. Williams, 24 faculty members including several department heads, nine undergraduates and seven graduate students.

In summarizing the afternoons, Chancellor Bacow noted that there had been a "lot of convergence" in the recommendations made by the participants. One idea repeated by a number

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Alexander Slocum, the Alex and Brit d'Arbeloff Professor of Mechanical Engineering (left), talks with Alexander V. d'Arbeloff, chairman of the Corporation, just before the "charrette" to brainstorm about ideas for improving undergraduate education with the help of a \$10 million gift from Brit and Alex d'Arbeloff.
Photo by Donna Coveney

Thousands prepare for Commencement '99 with 'Click and Clack'

■ By Robert J. Sales
News Office

President Charles M. Vest and Provost Robert A. Brown will present degrees to about 2,400 undergraduates and graduate students at MIT's 133rd Commencement on Friday, June 4. Dr. Brown will be presiding at his first Commencement as provost.

The Commencement Committee has announced the full program for the 1,100 seniors, 1,300 graduate students

and 9,000 relatives and friends expected to attend the ceremonies on Killian Court.

The Commencement address will be given by MIT graduates Tom and Ray Magliozzi, known as "Click and Clack, the Tappet Brothers," hosts of the NPR radio series *Car Talk*. The traditional charge to the graduates will be given by President Vest.

Chancellor Lawrence S. Bacow will preside at the hooding ceremony for

(continued on page 8)

Tech Week activities include revived Great Court Gala

More than 3,000 alumni/ae are expected to return to campus for class reunions, Tech Week activities, a Technology Day program that spans two days and MIT's 133rd Commencement ceremony.

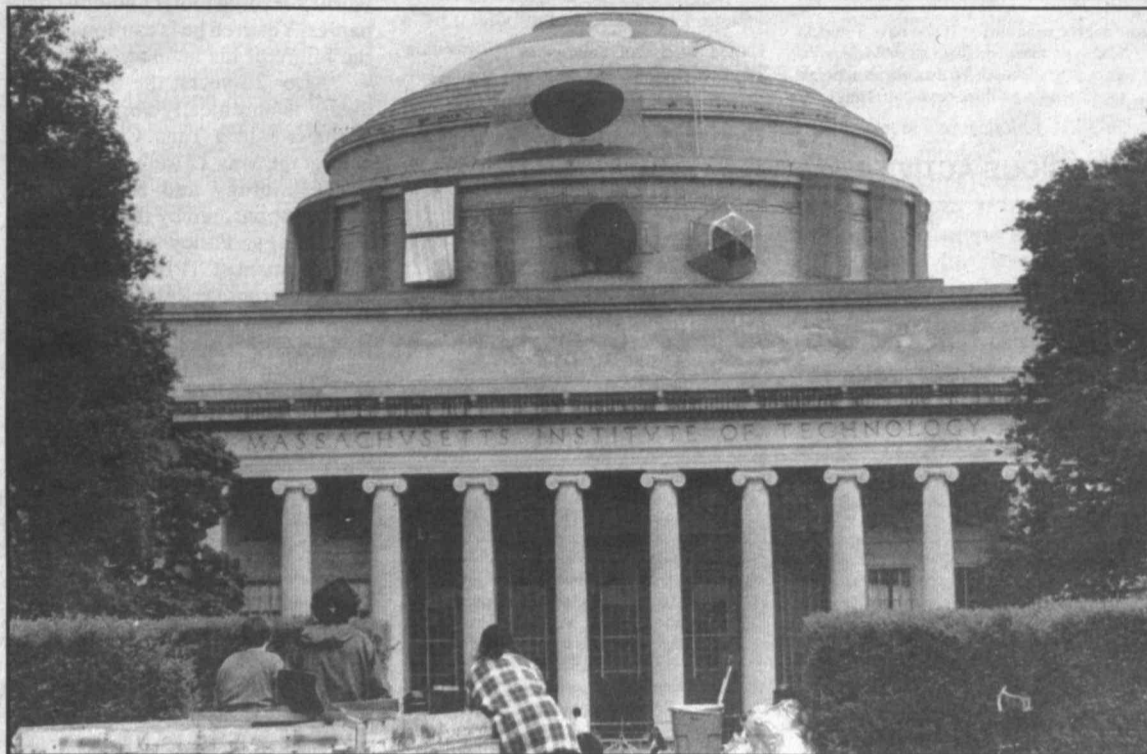
The annual Tech Night at Pops that includes a post-concert reception in Symphony Hall takes place on Thursday, June 3. Tours of Boston Harbor, the Big Dig, the Museum of Fine Arts' conservation laboratories and the Haystack Observatory are scheduled for Friday, June 4 (most of these events have already sold out).

Outdoor activities during the weekend include golf and tennis clinics, the Tech Challenge Games, an alumni/ae sail and the third annual Reunion Row. The

Henley Team of 1955 will be participating in the row, along with teams from the classes of 1939 to 1994.

The Great Court Gala, first held in 1916, will be reinstated for returning classes and graduating seniors after a 73-year absence. There will be entertainment at three sites from 9pm-midnight on Saturday, June 5. Bob Bachelder and the Totem Pole Swing Orchestra will hold center stage in Killian Court, with tables grouped by class. Desserts, coffees and cordials will be served. The Bush Room will host a piano bar, and disco music will be featured in Lobby 13.

The Classes of 1929, 1934, 1939, 1944, 1949, 1954, 1959, 1964, 1969, 1974, 1979, 1984, 1989 and 1994 will hold reunions.



The latest hack atop MIT's Great Dome depicts R2D2, just in time for the opening of the prequel, *Star Wars: Episode I—The Phantom Menace*.
Photo by Donna Coveney

Hackers turn dome into R2D2

■ By Robert J. Sales
News Office

MIT students, who couldn't insulate themselves from the *Star Wars* hysteria even while studying for finals, joined the hype Monday by converting the Great Dome into an oversized replica of the droid R2D2.

MIT Campus Police discovered the red, white, blue and black lightweight mesh fabric panels representing the robot's sensors and lights on the dome during routine patrol at 4:18am. At about the same time, the unofficial

MIT Hack Hotline spread the news to selected members of the community by phone.

Assistant Safety and Environmental Officer David M. Barber received a memo that described the hack's safety features, how it works, and how the panels are constructed and mounted, as well as directions on how to remove the cables. The memo, addressed to "Imperial Drones," is signed "Rebel Scum." A dozen donuts were also left at the scene for Mr. Barber and Gary F. Cunha of the Department of Facili-

ties, who inspected the hack together.

"It's one of the more professional hacks I've seen from a structural and safety standpoint," said Mr. Barber. "They went to great pains to protect the dome. The material is very light and the wind will blow through it, not billow up behind. It is colorfast and won't run in the event of rain. The whole thing is very well done."

The hack will be left intact until Thursday at 8am, weather and rigging deterioration permitting. The much-anticipated *Star Wars* prequel, *Star Wars: Episode I—The Phantom Menace*, opens Wednesday night.

Hacks are pranks or practical jokes that challenge the perpetrators and amuse the MIT community (and

(continued on page 8)

\$20M gift to support imaging technology

A \$20 million gift from a Greek couple will create a new center within the Harvard-MIT Division of Health Sciences and Technology (HST) dedicated to biomedical imaging.

President Charles M. Vest and Joseph B. Martin, dean of Harvard Medical School, announced on May 18 that the gift from Thanassis and Marina Martinos of Athens will establish the Athinoula A. Martinos Center for Functional and Structural Biomedical Imaging, named for the couple's late daughter.

Biomedical imaging, a relatively young field, enables physicians and scientists to "see" and better understand tissue and organ function. It

provides physicians with the ability to visualize the structure of tissues and to capture their function on film.

HST brings together science and engineering at MIT and Harvard, the Harvard Medical School, and its affiliated hospitals and research centers to solve problems in human health. The largest biomedical engineering and physician scientist training program in the United States, HST is responsible for significant advances in biology, health-related technology and medicine.

"The new center is a profoundly important venture that, taken together with our collaborating clinical imaging centers, can dramati-

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R2D2 in the original *Star Wars*.

IN BRIEF

FACULTY MEETING

A regular meeting of the faculty will be held this afternoon at 3:15pm in Rm 10-150. The agenda and other information is available on the web at <<http://nimrod.mit.edu/depts/archives/facmin/>>.

NO TECH TALK

MIT Tech Talk will not be published next week in preparation for the awards issue that will come out the week of Memorial Day (June 2).

The theme of the two-day Technology Day program is "The Human Body: Emerging Medical Science and Technology."

On Friday, June 4 from 3-5pm in Rm 10-250, alumni/ae involved in medicine, biotechnical research and health care will participate in a panel discussion of "Biomedical Entrepreneurship." The moderator will be Dr. Jerome H. Grossman (SB 1961), chair and CEO of Health Quality Inc. Panelists are Noubar Afeyan (PhD 1987), senior vice president and CBO of Perkin-Elmer Corp.; Dr. Mark Braunstein (SB 1969), chair and CEO of Patient Care Technologies; Jerome Goldstein (SB 1960,

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Student Notices

* Open to public
** Open to MIT community only

May 19-June 6

ANNOUNCEMENTS

June degree candidates: If you have a student loan, you must complete an exit interview prior to graduation. To arrange an appointment, send e-mail to <ewolcott@mit.edu> or call x3-4007.

RELIGIOUS ACTIVITIES

The Chapel is open for private meditation 7am-11pm daily.

Baptist Campus Ministry**—Weekly events: Sunday Nights at the RAC, 6pm, Main Dining Rm, Bldg W11. Home-cooked meal at 6pm (cost: by donation), followed by Bible Study. Tuesday Vespers, 6-6:30pm, chapel. A quiet time for reflection. More info: x3-2328.

Baptist Student Fellowship*—Weekly meetings on Tuesdays, include dinner followed by Bible Study, 5:30-7pm, Bldg W11, small dining room. Sponsored by Baptist Campus Ministry. More info: x3-2328.

Campus Crusade for Christ**—Weekly meeting on Wednesdays, 8pm, PDR 1 & 2, 3rd fl Student Center. Morning prayer, Tuesday and Thursday, 8:30am, Rm W11-080 (CFL). More info: x2-1781 or <bigbob@mit.edu>.

Christian Science Organization**—Thursdays at 7pm. Call x3-8797 or <lnorford@eagle.mit.edu> for further information.

Communitas-Life Together**—Protestant Worship Sunday at 11am. Sponsored by: American Baptist Church, United Church of Christ, United Methodist Church, Presbyterian Church (USA). Chaplain John Wuestneck, x2-1780 or <chaplain@mit.edu>.

Graduate Christian Fellowship**—Weekly meetings Fridays at 6pm. Also weekly Bible studies, prayer and volleyball. More info: <http://web.mit.edu/mitgcf/> or <mit-gcf-info@mit.edu>.

Lincoln Laboratory Bible Study**—Wednesdays, noon-1pm, weekly Bible study in the Division 7 conference room, D-430. More info: Sharon Frigon at 981-7751 or <frigon@ll.mit.edu>.

Lutheran-Episcopal Ministry at MIT*—Regular Wednesday worship 5:10pm, followed by supper in the Bldg W11 dining room. On the second Sunday of each month, LEM assists at Common Cathedral, a gathering of homeless people on the Boston Common, at 1pm. More info: x3-0108.

Meditation and Discourse on the Bhagavad Gita*—With Swami Sarvagatandana, MIT Chaplain and Head, Ramakrishna Vedanta Society of Boston. Every Friday, 5:15-6:30pm, MIT Chapel. Sponsored by the MIT Vedanta Society. More info: 661-2011 or <mehta@cvtel.com>.

MIT Hillel**—Tuesdays: 5:30pm Beginning Hebrew Class; 6:30pm Intermediate Hebrew Class. Wednesdays: noon Hebrew Conversation Table in Walker Cafeteria; 7pm Haftorah Class. Thursdays: noon Taste of Torah. Fridays: 6pm Egalitarian Chavurah Services and Orthodox Minyan Services; 7pm Shabbat dinner. Saturdays: 9am Orthodox Minyan Services; 12:45pm Shabbat lunch. More info x3-2982.

MIT Muslim Students Association*—Five daily prayers, Bldg W11; also Friday congregation 1:10-1:45pm, Rm W11-110. Info: x8-9285.

MIT Orthodox Christian Fellowship**—Wednesdays at 5:30pm in Student Ctr DR 1 for dinner followed by Chapel Vespers. John Kymissis x5-7649 or Costa Sapuntzakis x5-7683.

Protestant Eucharist/Holy Communion*—Wednesdays, 5:10pm in the Chapel. Sponsored by the Lutheran-Episcopal Ministry at MIT. More info: x3-2325 or <lutheran@mit.edu>.

Taize Prayers*—Fridays, noon-12:30pm in W11, the Board Room. All invited. Sponsored by students from the Protestant Ministry at MIT, Tech Catholics and the Lutheran-

Episcopal Ministry. Taize Prayers, coming from the Taize community in France, are a form of Christian meditation based on singing and silence.

Tech Catholic Community**—Sunday Masses 9:30am, 1pm and 5pm. Weekday Masses Tuesdays and Fridays 12:05pm when classes are in session. More info: x3-2981 or <catholic@mit.edu>.

United Christian Fellowship (UCF)**—A member of INTERVARSITY Christian Fellowship. Weekly Large Group meetings Fridays at 7:15pm, 3rd floor of Student Center. Weekly dorm-based bible studies on campus. See web page <http://web.mit.edu/ucf/>. For more info: Sherry or Sara at 576-5157 or <mitucf@mit.edu>.

STUDENT JOBS

For other job listings and more information about the following listings, go to the Student Employment Office, Rm 11-120 or <http://web.mit.edu/seof/>.

Off Campus, Technical, Programming. Bullet Point News, a unique hybrid publication utilizing the best features of different media, is a Sloan student start-up. Looking for assistance in getting a live web site running in 3 weeks. Urgently looking for a person with html and scripting experience to do basic web programming (Unix preferred). Programming knowledge must include user registration/passwords. Eye for web design and some knowledge would be helpful. Get in on the ground floor of a fun start-up with the potential for contracting and/or full-time employment in the summer and beyond. 20-30 hrs/wk initially, with more to follow. Negotiable wages. Dale Galvin <dgavin@bulletpointnews.com> or 557-9973.

Off Campus, Technical. Need a student to assist in installing software and overall technical support. Once software is installed, need help finding location of applications, such as Word and Excel. Live right off of Mass. Ave. Flexible hours. \$15/hr. Jeanne Burton at 547-6998.

The following positions are for students with Federal Work Study eligibility.

Community Service. Assistant teachers needed in Cambridge afterschool program. Hours are flexible between 2 and 6pm. Contact Kelly Tyler at 349-6287.

Community Service. Tutor children (K-5th grade) in math and English. Play games, organize science activities, teach diligence, honesty, fairness, and kindness through your example. Chinese speaking helpful. Claudia Euler at 483-6382.

VOLUNTEERS

The MIT Public Service Center (PSC) has compiled the following volunteer opportunities. Please contact the PSC for more information (Room W20-547, x3-0742).

The New England Aquarium needs volunteers to help at their 30th Birthday Bash on Sunday, June 20. Contact Brinn or Maureen at (617)973-5235 or <vols@neaq.org> for more information.

The American Red Cross of Massachusetts Bay is looking for volunteer teachers to teach English as a second language during the summer session (6/21-8/14). Training provided. Call Sarah Marlay at (617)375-0700 x202 to get involved.

Options Alternative Day Service seeks volunteers to assist a program that supports people with disabilities during the lunch hour. Volunteers needed Monday through Friday 11:30am-1pm. Call Scott L. or Heather at (617)923-2021 for details.

UROP

The UROP Office invites MIT and Wellesley students to join faculty members on research projects. For information on procedures, please contact the UROP Office, Rm 7-103 <urop@mit.edu> or x3-7306. Information and current listings available on-line at <http://web.mit.edu/urop/www/>.

CABLE

For program information, contact Randy Winchester at x3-7431, Rm 9-050, <randy@mit.edu> or see the web site at <http://web.mit.edu/org/micable/www/home.html>.

Genzyme CEO predicts more jobs but fewer biotech companies

■ By Nancy DuVergne Smith
CTPID Communications

Henri Termeer transformed Genzyme Corp. from a modest venture in the early 1980s to one of the world's leading biotechnology companies. Yet even he is cautious about the future of his industry.

"After 20 years, the biotech industry is chronically unprofitable," Termeer told a Tang Center audience at the May 12 Industry Leaders in Technology and Management Lecture sponsored by the Center for Technology, Policy and Industrial Development (CTPID) and the Office of Corporate Relations.

A second major challenge faces the industry: "The health care delivery system is in no way geared to receive the innovations we are trying to create," he said. "It's a real bottleneck."

Nevertheless, Mr. Termeer, Genzyme's CEO, president and

chairman, has led his company to profitability, one of only about 10 of the existing 1,300 biotechnology companies so distinguished. Collectively, the industry produced \$18 billion in revenues last year but still lost \$5.1 billion, he said. And this industry loses more money every year—losses sustained by venture capitalists and stockholders.

Repeated losses have cut into investors' faith in the once red hot biotechnology field, Mr. Termeer said. He predicted that in the next 10 years, a dozen companies will thrive and the rest will simply disappear. Yet the strength of these companies, combined with increases in federal research spending and growth in research-based pharmaceutical companies, will account for overall job growth.

Increases in the National Institutes of Health budget, predicted to double in the next few years to \$40 billion, will help the biotech industry by funding basic research at aca-

demic institutions, which will ultimately reduce development costs.

Biotech's other problem—delivering innovations to patients—is an outgrowth of efforts by health care providers and insurers in the mid-1990s to reduce costs. The Clinton administration's early focus on health care reform resulted in an array of reimbursement regulations and cost constraints, Mr. Termeer said. "Technology became a problem" rather than a solution to human suffering, he said.

Today, if new drugs or procedures cost more than existing therapies, they may be denied to patients even if they can reduce suffering and save money in the future. And new therapies are slow to markets—despite the FDA's progress in shortening average approval time from three or four years to 12 months—because insurers are asking for additional efficacy studies. "This slows down innovation," Mr. Termeer said.

Mr. Termeer, a board member on numerous biotechnology corporations, trade groups and business organizations, also has won awards for innovation as well as for human rights efforts. Ultimately, he sees the biotech field as very human and very rewarding. "In the biotech industry, we are trying to create more life during life," he said.

Thurrow discusses building wealth at innovation forum

Sloan School Professor of Management and Economics Lester C. Thurrow discussed innovation in the new, global, knowledge-based economy, and included an introduction to a concept he calls a "wealth pyramid" at Lemelson-MIT Program's Innovation Forum last week.

Professor Thurrow, author of the upcoming *Building Wealth: The New Rules for Individuals, Companies and Nations* (HarperBusiness), contends that knowledge, for the first time in history, is the new basis for wealth. In the past, wealth was based on land, machinery or natural resources.

"In the future when capitalists talk about their wealth," he said, "they will be talking about their control of knowledge. The Bill Gateses of the world will be on top—not the Rockefellers, Carnegies or Morgans."

To compete in this new economy,

companies and nations need to build a "wealth pyramid" using building blocks such as a solid social organization, entrepreneurial skills and education to encourage creativity and innovative behavior. "The world is on the verge of another industrial revolution, and not all nations will be ready for it," Professor Thurrow said. "The challenge is creating and sustaining an entrepreneurial environment where change does not mean the end."

Professor Thurrow has written several best-sellers including *The Zero Sum Society* and *Head to Head*. He is chairman of the Lemelson-MIT Program for invention and innovation, whose May 12 event was the last in its Innovation Forum series of on-campus speaking events designed to address innovation-related issues.

Shannon Peavey
Sloan School

Throwing it away?

Post it on the "reuse" e-mail list, where everything from old computers to kittens can be given away. For more information, send e-mail to:

<reuse-request@mit.edu>

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Contact the News Office at x3-2700 or send e-mail to <newsoffice@mit.edu>. Also see our web page at <http://web.mit.edu/newsoffice/www>

Crimewatch

The following summary contains most of the incidents reported to Campus Police from April 29-May 5, 1999. It does not include medical shuttles, ambulance transfers, false alarms and general service calls.

April 29: Cambridge, pika: report of suspicious person. East Campus: check on student. Bldg. 9: harassing phone call. Bldg. 39: annoying phone calls. Bldg. 13: attempted break into a room. Bldg. 5: suspicious activity, report of a disturbed person. Bldg. E19: laptop computer and speakers stolen, \$2,817. Bldg. 3: report of suspicious person, checked out okay.

April 30: Bldg. 54: report of suspicious person, same issued trespass warning. Bldg. E53: suspicious persons, same issued trespass warning. Boston, Commonwealth Ave.: noise complaint, all quiet. DuPont gym: suspicious person. Walker: laptop computer and cash stolen, \$2,600. Senior House: construction tools stolen. DKE: monies fraudulently stolen from debit account, \$179. Main St. at railroad tracks Cambridge Police assist MIT. MIT Police cruiser struck by another vehicle. Bldg. E25: suspicious person report, gone upon CP's arrival. East Campus: report of trespassing. Commuter lot: two individuals issued trespass warnings. Bldg. 26: report of alcohol in lobby; same removed by CP's arrival. Bldg. 39: male arrested for trespassing. Assist Cambridge Police: motor vehicle accident at Mass. Ave. and Memorial Dr. Amherst Alley by Green Hall: noise complaint, students moved along.

May 1: Senior House: wallet stolen, \$40. Westgate: pan left unattended on stove causing a lot of smoke. Boston, Sigma Alpha Epsilon: noise complaint, music turned down. Bldg. E52: report of skateboarders, same left area without problem. Bldg. 2: report of suspicious person, same gone upon CP's arrival.

May 2: Kresge: party problem. Westgate: report of suspicious person, gone upon CP's arrival. 33 Mass. Ave.: male arrested for trespassing and other related charges. Student Ctr.: check on two students. Bldg. NW30: check on individual. Bldg. W8: check on suspicious person, trespass warning issued.

May 3: Sloan lot: assist Cambridge Police for vehicle possibly involved in vehicle accident. Bldg. 2: male arrested for trespassing. Boston, AXO: 3 homeless persons removed. Bldg. W71: someone tampering with mail. Bldg. 4: male arrested for trespassing. Albany St.: intoxicated homeless person, transported to shelter by Pro ambulance.

May 4: Vassar St.: assist Cambridge Police with minor motor vehicle accident. Albany lot: vehicle broken into and CD player and change stolen, \$155. East Campus: laptop stolen, \$100. Bldg. E15: report of suspicious person. Bldg. W85: fraudulent use of credit card, \$242. MacGregor: annoying phone calls. Bldg. NW61: homeless person sleeping in doorway, individual assisted to shelter. Main lot: person stopped for excessive speed. Student Ctr.: suspicious person, trespass warning issued.

May 5: Burton: annoying phone calls. Bldg. 9: report of suspicious person, same checked out okay. Hayward lot: possible domestic situation, all checked out okay. Bldg. E23: skateboarders, same moved along. Westgate: bicycle stolen, \$200. Bldg. E19: report of 911 hang-up, no cause found. Briggs Field: animal complaint. Burton: camera stolen, \$300. Bldg. 2: suspicious activity. Westgate lot: '95 Acura stolen, found in Boston next day stripped. Bldg. 2: two males arrested for lewd and lascivious conduct. WILG: report of two suspicious persons, gone upon CP's arrival. Bldg. NW30: two individuals issued trespass warnings. Student Ctr.: report of suspicious person, checked out okay.

Two on faculty honored by Technion

Two MIT professors will be honored by Technion-Israel Institute of Technology in June.

Robert G. Gallager, professor of electrical engineering and computer science, has won the 1999 Harvey Prize for science and technology from the Technion. He will accept the award June 16 at a ceremony in Haifa. Arnold L. Demain, professor of industrial microbiology in the Department of Biology, will be awarded an honorary doctorate of science from the Technion next month, although he will not be able to travel to Israel to accept the degree until next year.

Professor Demain, a leader in biotechnology for four decades, will be recognized for "outstanding achievements in industrial microbiology and biotechnology and his unique role in promoting cooperation between industry and academia," his citation reads.

Professor Demain has more than 425 publications and 16 US patents to his credit and is co-editor or co-author of 10 books. He has educated numerous Israeli scientists, participated in ongoing research with Israeli laboratories and advised Israeli companies and universities in these fields. A strong supporter of Israel, he has refused to participate in international meetings when Israeli scientists were barred from participating.

Professor Demain holds the BSc (1949) and MSc (1950) from Michigan State University and the PhD (1954) from the University of California.

Professor Gallager was chosen to receive the Technion's Harvey Prize in recognition of his fundamental contributions to information theory and to the theory of communication networks. "His book, *Information Theory and Reliable Communication*, has been for a

number of decades the bible of information theory," his citation reads. "His monograph, *Low Density Parity Check Codes*, has had a tremendous impact on the theory and practice of coding, and was a precursor to the important recent developments of turbo codes. His work on routing and multiple access network algorithms has revolutionized the theory of computer networking."

Professor Gallager received the BSEE from the University of Pennsylvania in 1953 and the SM and ScD in electrical engineering from MIT in 1957 and 1960. Following short stints at Bell Labs and the US Signal Corps, he has been at MIT since 1956.

The Harvey Prize Council, composed of members of the Technion Senate and the Israel Academy of Science and Humanities, considers only world-class figures for the \$35,000 prize, which recognizes individuals responsible for breakthroughs in science and technology, human health and peace in the Middle East.

Former recipients of the prize, established for the American Society for the Technion in 1972 by the late Leo Harvey of Los Angeles, include Mikhail Gorbachev, physicist Edward Teller and former MIT faculty member Claude Shannon, inventor of information theory and father of modern communication science.

This year's award for human health will go to Elizabeth Blackburn, professor and chairman of the Department of Microbiology and Immunology of the University of California in San Francisco, for her work on understanding the nature of telomeres.

Deborah Halber



Gallager



Demain

MIT-led consortium offers master's degree in product development

An MIT master's degree program for engineers will branch out to two other universities with the help of a \$600,000 National Science Foundation grant.

MIT's Center for Innovation in Product Development (CIPD) and its partners at the University of Detroit Mercy (UDM) and the Rochester Institute of Technology (RIT), along with the System Design and Management program at MIT, have established a new master's degree in product development at the three institutions.

The NSF grant, which will be awarded over two years, will assist the Center and its partners in their efforts to combine the best ideas and experience of industry, academe and government to advance the theory and practice of product development.

The new consortium, called "PD21: the Education Consortium for Product Development Leadership in the 21st Century," will employ processes of continuous interaction and feedback from its industry partners to ensure quality. Consortium members include the CIPD (an Engineering Research Center), the three universities, the US Navy, and industry partners such as Ford, General Motors, IBM, ITT, Polaroid and Xerox.

The master's degree curriculum, developed initially in the System Design and Management (SDM) program in consultation with industry, leads to a joint degree offered by the Colleges of Business and Engineering at RIT and at UDM, and by the Sloan School of Management and School of Engineering at MIT. Intended to help experienced engineering professionals move into leadership and management positions, the curriculum focuses on the end-to-end product development process, emphasizing the integrated systems perspective needed to conceive, create, launch and support today's increasingly complex products.

"We are grateful that NSF was willing to fund a project that not only cuts across the boundaries of engineering and management disciplines, but also gives substantial support to a collaboration that includes three universities and major industry partners," said Professor Warren Seering, CIPD director. "The PD21 consortium offers a new model in graduate engineering, management and product development education in the US. This curriculum incorporates two powerful streams of information flowing from engineering and management into the curriculum, the latest concepts in product development provided by university research, and the experiences of industry, developed through specialized case studies."

"We see our industry partners as key to PD21's success," added Conger Gabel, CIPD executive director and an executive on loan from Xerox. "The companies provide important customer requirements for the program, real examples, and cases and projects that will enrich student experience. Regular engagement by the faculty with industry has been a rewarding experience for both our companies and the universities."

The curriculum includes core courses in product development leadership, system architecture, system engineering, and system and project management, along with a set of foundation courses that provides both engineering depth and management breadth. Students must complete a project-oriented thesis or capstone project, often based on a problem identified in the companies where they work. Enrollment in the program is open to students from any company with the requisite education and industry experience.

"MIT has identified the conception, design and development of complex systems and products as a central educational and research undertaking," said Professor Thomas Magnanti, dean of the School of Engineering and co-founder of SDM. "We developed the SDM curriculum with extensive input from more than 30 companies to identify the core competencies that they deemed essential for their technically grounded leaders. We believe strongly in the diffusion of the curriculum that the PD21 consortium represents and feel that the partnership with industry, RIT and UDM signifies our commitment to assisting US industry to position itself as a world leader well into the next century."

RIT and UDM officially launched their programs in January with RIT's inaugural class of 21 students from Xerox and ITT, and UDM's class of 32 students from Ford. RIT and UDM offer an executive education format that includes classes over full days or concentrated in evening hours.

MIT, with its unique distance education program that allows students to attend classes by videoconferencing and web technology, enrolled its third cohort of 48 students from 16 companies and the Navy. The next group of students will begin the program in January 2000.

Funding from the NSF grant will be administered by CIPD and used by consortium members for program and course development. The consortium plans to expand this program to additional universities across the nation.

Researchers discuss problems and prospects

By Deborah Halber
News Office

There may be more Barbie dolls than Americans connected to the Internet in five years, Professor Nicholas P. Negroponte said at an MIT panel discussion last week.

While discussing research that spans the boundaries of academia and industry, he and others speculated on the types of alliances that will be needed to help computers blend more seamlessly into people's future daily lives. The session was part of the 1999 MIT Research Directors Conference, held in Kresge Auditorium, Johnson Athletic Center and the Stratton Student Center on May 11-12.

The sixth annual conference, sponsored by the Industrial Liaison Program (ILP), drew about 400 executives who manage research at technology-based companies around the world. In addition to talks by MIT experts and researchers, participants heard presentations by executives of IBM, Pirelli, the Tokyo Electric Power Co. and others.

In a wide-ranging discussion moderated by John Benditt, editor in chief of Technology Review, four members of the MIT community and an author who has worked closely with MIT speculated on the future role of computers in society and chided industry for its short-term outlook. "We're desperately interested in trying to help you create your future," said one panelist. "If you can't create a vision for your future, don't accuse us [in academia] of playing in the sandbox."

CHIPS ARE EVERYWHERE

Professor Negroponte, the Jerome B. Wiesner Professor of Media Technology and director of the Media Laboratory, said toys have a higher semiconductor content than computers on a desktop. He has found that among the many companies interested in sponsoring research at the Media Lab, more are tending to produce products used by everyday people on a daily basis.

Professor John Guttag, head of the Department of Electrical Engineering and Computer Science and leader of the Software Devices and Systems Group in the Laboratory for Computer Science, agreed that 97 percent of the processors that exist today are in things other than computers—"things we

don't want to fail," he said.

Meanwhile, the software that drives these systems will have to improve, "because we will insist on it," he said. "I would never get into a car if the probability of it crashing was the same as that of my desktop." The problem here is that although testing hardware is relatively straightforward because it involves testing the manufacturing process, testing software is trickier. "How do you test a design?" he said.

As computers evolve, they will appeal more to people's senses of vision, hearing and touch than to their intellect, Professor Guttag said. "A great deal of the brain is based on visual and auditory cues. The question is, how can we use computers to tap into these great abilities people have?" he said.

Instead of inserting people into an unreal world of virtual reality, he predicted that computers will foster a world of augmented reality, where sensors allow people to feel and hear and see

things that they couldn't feel and hear and see before.

Robert Buder, author of *The Invention That Changed the World*, said corporate labs are beginning to realize that their research must span interfaces and boundaries, and that corporate research is more alive and vigorous now than at any other time since Sputnik spurred Americans' interest in science and technology in the 1950s.

IMPROVING SATELLITES

Professor Edward F. Crawley, head of the Department of Aeronautics and Astronautics and director of the Space Engineering Research Center, said the aerospace industry is battling the bad publicity generated by six major satellite launch failures in a short span of time. "We call these SSTO—single stage to ocean," he quipped.

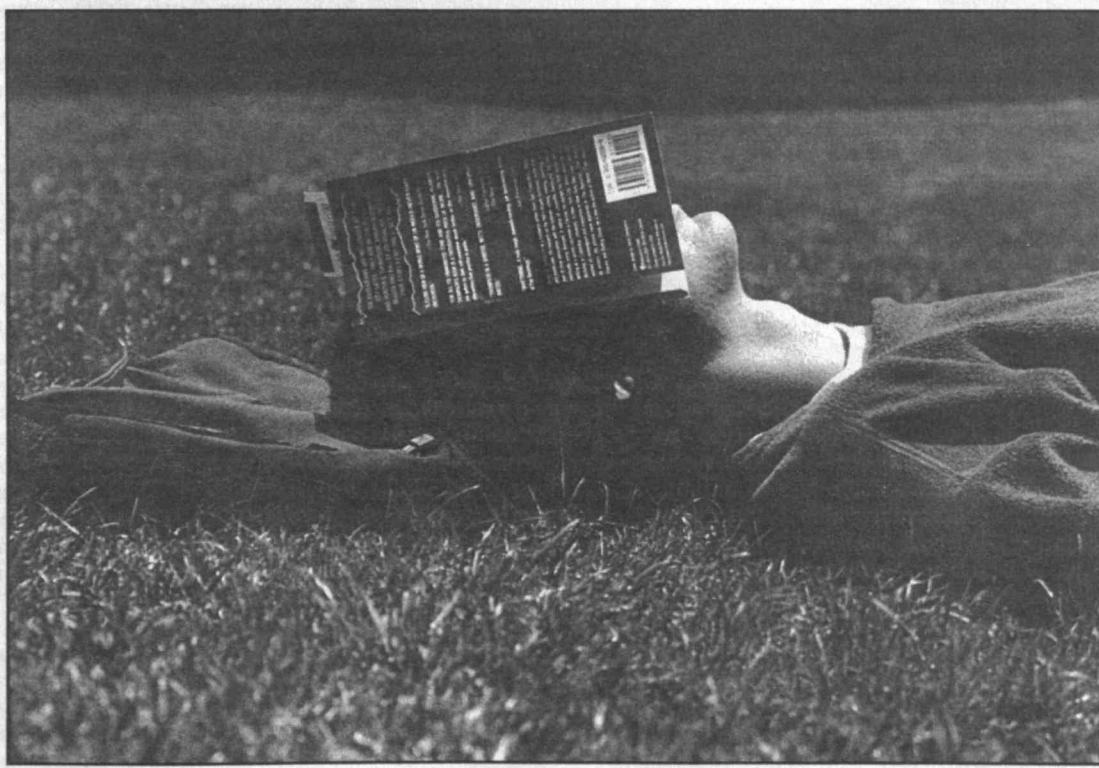
In the drive to create launch vehicles that work and are commercially successful, there is a need for

engineers and business leaders to come together and take a new interest in how each works and how they set priorities, he said.

Robert S. Langer, the Germeshausen Professor of Chemical and Biomedical Engineering, said the biomaterials field also requires an enormous amount of crossover of disciplines. Professor Langer, a pioneer in tissue engineering, said material scientists, chemical engineers and physicians have come together to create an "enormously exciting time in biomaterials." He is affiliated with the Division of Bioengineering and Environmental Health and the Department of Chemical Engineering.

In addition, he said, the people who will fuel the next great discoveries need to possess an ability to dream and a good dose of stubbornness to counter those who claim their great ideas won't work.

Light reading



Peter Sabin, a prospective graduate student in naval architecture, uses his book as a sunscreen while relaxing after spending the morning talking to people in the Department of Ocean Engineering.

Photo by Donna Coveney

Automatic page-turner could help musicians, the disabled

■ By Denise Brehm
News Office

An MIT inventor recently built a device that matches the futuristic requirements of George Jetson with the technological know-how of Leonardo da Vinci. Ernesto Blanco has designed a page-turner that automatically turns the pages of a book without the reader lifting a finger.

The device was created at the request of musicians, who don't always have a free hand for turning the pages of their music while they're playing. But it could also prove useful for people with multiple sclerosis, Parkinson's disease or other medical conditions.

The high-tech gadget offers improvement to a very low-tech medium: printed books.

"The technology I'm using here was available to Leonardo da Vinci in 1490; we're 500 years behind in inventing this," said Adjunct Professor Ernesto Blanco of mechanical engineering, who invented his first page-turner in response to a request from his violin-playing niece, his second in response to a pianist friend, and the third for an exhibit at MIT's List Visual Arts Center. He's currently working on a fourth.

"There are a few page-turners on the market already, but they're very expensive and very unreliable," said Professor Blanco. "This one cost only about \$150 to make. And it works."

The device utilizes a mechanical arm with a small spool of sticky tape that lifts each page and turns it. The musician or reader can operate it with the push of a button, or set a timer. Professor Blanco built the prototypes himself using molded plastic and circuitry; only the small motor and the batteries were off-the-shelf items.

He built the first one about 23 years ago.

"My niece asked if I could build one for her. I said, 'Yes, it should be very easy.' I went to work and found it wasn't so easy. So I told her that I was very, very busy right then," said Professor Blanco, who explained that his difficulty was in designing a system that would work on any size page and any weight of paper. After a couple of

weeks, he became frustrated.

"I stood up in front of the machine and said, 'Why can't I do this? Am I not good enough?' I've found that when you reach the point where you begin to wonder whether it can be done, you become very, very creative. Unfortunately, that's when most people give up. Instead, you should try something—anything—whether it's logical or not so logical," he said.

Professor Blanco teaches engineering design courses at MIT and uses the page-turner as a case study on the design process. Part of its beauty is that it has an inexpensive design using basic mechanics, but which demanded ingenuity to come up with a workable solution.

For instance, in this case suction wouldn't work as the mechanism for lifting pages, because paper is porous. And sticky tape, which works well now, proved difficult at first; once it stuck to the paper, the page wouldn't fall off. Professor Blanco finally realized the paper would fall off when the tape was rolled, and thus hit upon the answer: a spool of sticky tape that rolls a bit and strips off easily.

"After I came up with the answer, I thought, 'Why didn't I think of this before?' Then I consoled myself with the thought that no one else had thought of it either," he said.

Professor Blanco said he hasn't marketed any of his page-turners yet because a market study done at the Sloan School revealed discouraging prospects.

"If market research had been done on the airplane, would anyone have put the money into its development? How can anyone determine the importance of something unknown to society through a marketing study?" said Professor Blanco, who holds 14 patents and has filed for another for the most recent page-turner. Most of his patents are on medical devices. One patent is for Flip-it, an automatic pancake-flipper currently being made in China that will be marketed in the United States (MIT Tech Talk June 21, 1995).

The sticky-tape page-turner was designed at the request of Jennifer Riddell, assistant curator at the List



Adjunct Professor Ernesto E. Blanco with the page-turner he invented, inspired by a young musician's request. Photo by Donna Coveney

Visual Arts Center, who needed it for an art exhibit last fall.

Lewis de Soto's *Recital* revolved around a book called *An Atlas of the Brain of a Pianist* about a deceased pianist/composer, Chiyo Tuge, whose neurosurgeon husband dissected her brain in an effort to capture the essence of her creativity. In de Soto's exhibit, a player piano performed with the book resting on the piano in place of printed music. The page-turner automatically turned the pages every three minutes. The gallery had purchased a page turner that didn't work. It was returned after Professor Blanco agreed to supply a reliable model.

"The page-turner really made the exhibit. The whole thing was very evocative and elegiac. You walked into a darkened room and heard this music

and there was nobody playing it," said Ms. Riddell, who said the exhibit has now moved on to Milan, sans the page-turner.

"MIT is probably one of the few places in the world where we could have found someone to engineer a page-turner from scratch in the space of about two months. Meanwhile, a company whose specialty is making such products for the disabled cannot seem to get it right," Ms. Riddell said.

It's fitting that Professor Blanco's work was used for an art exhibit exploring the creative portion of the brain,

something he tries to get at in his teaching. He urges both his students and his consulting clients to approach problems unconventionally.

"My vocation is to show our very competent engineers that they can be creators and not just optimizers. We at MIT develop the left side of the brain, the analytical side. We're not paying enough attention to the other half of the brain, the more creative side," said Professor Blanco, who taught at MIT from 1960-64 and returned in 1977 after spending many years working full-time in industry on a wide range of innovations.

Institute Calendar

* Open to public
** Open to MIT community only

(For arts-related listings, see page 7.)

INSTRUCTIONS: Seminars & Lectures listings must now be submitted to the online TechCalendar at <http://techcalendar.mit.edu>. If you have questions about that procedure, please contact help@techcalendar.mit.edu.

Listings for Community Calendar and Student Notices should be submitted using the web form at <http://web.mit.edu/newsoffice/tt/calendar>. If you have questions, please contact ttcalendar@mit.edu or x3-2704.

Events must be MIT sponsored and take place on the MIT campus or at an MIT affiliate (Draper Labs, Lincoln Laboratory, etc.).

Next deadline for all types of listings is noon Friday, May 28, covering events from Wednesday, June 2 through Sunday, June 14.

May 19-June 6

SEMINARS & LECTURES

(Listings compiled by TechCalendar, courtesy of The Tech.)

WEDNESDAY, MAY 19

Late Pleistocene Thermohaline Circulation and Climate Change on Millennial and Orbital Time Scales*—Bill Curry, WHOI. Sponsored by Physical Oceanography. 12:10pm, Rm 54-915. More info: x3-2177, ganacho@gulf.mit.edu or <http://puddle.mit.edu/~ganacho/sack.html>.

WEDNESDAY, MAY 26

Dynamics of the Meridional Overturning Circulation and the Role of Diapycnal Mixing*—Jeff Scott, MIT. Sponsored by Physi-

cal Oceanography. 12:10pm, Rm 54-915. More info: More info: x3-2177, ganacho@gulf.mit.edu or <http://puddle.mit.edu/~ganacho/sack.html>.

COMMUNITY CALENDAR

Learn to Sail Classes 1, 3 & 4: Wednesday, May 19. June 2. Classes 1, 2 & 4: Wednesday, May 26.** Meet people, learn to sail and enjoy yourself. Bring a change of shoes. 5:15pm. **Learn to Sail, Weekend Class: Sundays, May 23, 30, June 6.** 10am-1pm. Combines the first three evening classes into one. Sailing Pavilion, 51. **Learn to Sail on your lunch hour: Class 6 of 6, Wednesday, June 2.** Lunchtime Sailing Classes. 12-1pm. Learn to sail at lunch. You don't need a sailing card but please bring a change of shoes. **MIT Nautical Association Moonlight Sails & BBQs. Saturday, May 29.** 7pm, Sailing Pavilion, 51. Glide along the river after dark, sailing in a Rhodes-19. Bring along a flashlight and something for the BBQ on the dock afterwards. MIT Sailing Card required. More info: x3-4884, meking@mit.edu or <http://web.mit.edu/mit-sailing/www/>.

MIT Community Summer Softball—Umpire Clinic: Thursday, May 20.** 5:30pm, Rm 1-190. New teams and umpires welcome! More Info: throop@ultranet.com or X3-6207.

MIT Nike Summer Tennis Camp*—Weekly June 14-July 9. Registration now open. Tennis camp for boys and girls ages 7 to 16 at the MIT Varsity Tennis Courts. Five weekly sessions. More info: x8-0333, coach@mit.edu or www.ecamps.com.

Basic Pistol Marksmanship Course*—Four nights: June 17, 18, 24, 25. Registration now open. 6-9:15pm. DuPont pistol range. Sponsored by MIT Pistol & Rifle Club. Fee \$75 MIT community, \$100 non-MIT, \$25 discount for students. \$20 non-refundable deposit applied toward fee. Info/registration: Valerie Lowe, Draper 258-4769 or vlowe@draper.com.

Wives Group—May 19:** Tour of the Public Gardens. Meet at the MIT Coop in Kendall Square at 3pm. A support network sponsored by MIT Medical for partners and spouses of students, staff and faculty. Meetings held every Wednesday from 3-5pm in W20-400. Childcare provided. More info: x3-1614 or <http://web.mit.edu/medical/wivesgroup>.

MITAC

The MIT Activities Office (MITAC) serves the cultural and recreational needs of the MIT community (including MIT's retirement community). Two locations: (1) Walker Memorial Rm 005, 9:30am-3:30pm, Wednesday-Friday (2) Room LLA-218, x6130, Lincoln Lab, 1:15-4pm, Thursday and Friday only. More info: x3-7990 or julieh@mit.edu. MITAC accepts only cash or a personal check made payable to MIT. MIT IDs must be presented.

Red Sox vs. Minnesota Twins (Fenway Park, Boston)—Thurs., June 17, 7pm.** Ticket: \$20 grandstand seating section 12 (reg. \$24).

Riverside Amusement Park/Barbecue (Agawam, MA)—Sun., June 20,** 10am-9pm. Adult Ticket: \$23, Junior (36" - 48") Ticket: \$18, Child under 36" free. Purchase by 6/11.

Fame—The Musical (Colonial Theatre, Boston)—Thurs., July 8, 8pm.** Ticket: \$65.50 orchestra seating (reg. \$70) or \$37.50 balcony seating (reg. \$60). Purchase by 6/10.

Evita (Colonial Theatre, Boston)—Sun., Aug. 1, 7:30pm.** Ticket: \$70 orchestra seating (reg. \$75) or \$37.50 balcony seating (reg. \$60). Purchase by 6/25.

Red Sox vs. Kansas City Royals (Fenway Park, Boston)—Tues., Aug. 31, 7pm.** Ticket: \$20 grandstand seating section 12 (reg. \$24).

Red Sox vs. Toronto Blue Jays (Fenway Park, Boston)—Tues., Sept. 21, 7pm.** Ticket: \$20 grandstand seating section 12 (reg. \$24).

Rotating magnetic device wins 'perpetual motion' contest

■ By Deborah Halber
News Office

Junior Gaurav Tewari and sophomore John McBean walked away with \$250 each in prize money yesterday afternoon from the Concourse program's annual Perpetual Motion contest.

For the second time, the Concourse program offered a \$500 award to the best submission by an MIT undergraduate for a perpetual motion machine that incorporates electrical or magnetic fields. Students had to submit a written proposal written clearly enough to be understood by first-year MIT students.

Mr. Tewari, an electrical engineering and computer science major, and Mr. McBean, a mechanical engineering major, designed a machine that involves a magnetically levitated, flat rectangular bar rotating in a vacuum-sealed glass container.

A post on the bottom of the glass chamber protrudes through a hole in the center of the bar and keeps it positioned correctly. The bar will stay suspended and rotating in a horizontal plane because of the interacting forces of two magnets at its ends and four magnets attached to the walls of the chamber, all with the same pole facing inside. Also, a magnet at the base of the glass chamber repels the magnetic underside of the rotating bar and helps it levitate.

While the two say that their design does not rely on complete elimination of friction (the near-impossible necessity for a true perpetual motion machine), they believe their idea of setting an object in motion in a nearly friction-free environment should "guarantee zero dissipation of energy" and therefore perpetual motion.

Concourse is a special unified pro-

gram for first-year students that covers the entire core curriculum, offering the advantages of a small school without giving up the character and resources of MIT.

The contest submissions were judged by students and faculty, who rated each proposal according to their inability to refute it.

"Use of black holes, spatial singularities or magnetic monopoles are expressly forbidden. The motion must be truly perpetual and must not rely on 'natural' energy sources such as wind or tidal or planetary motion. In other words, you are invited to violate accepted fundamental laws in the most convincing way possible," the instructions state.

Robert M. Rose, professor of materials science and engineering, said that the contest is not an exercise in futility, but a great teaching vehicle. Students in a special Concourse class, Problems in Electricity and Magnetism, sometimes "invented" perpetual motion machines or seemingly unlimited supplies of energy.

Ensnuing discussions led to spirited arguments, analysis and, according to Professor Rose, "a much deeper understanding of freshman physics... Then it occurred to us that we should extend this challenge to the MIT community at large. The problems presented are meant to stretch the students' minds and give them a better intuitive feel for physics."

It's a fact

The first human-made gene fully functional in a living cell was synthesized in 1976 at MIT by a group led by Nobel laureate Har Gobind Khorana.

'Charrette' looks at how to use gift for educational innovation

(continued from page 1) of participants called for more undergraduate coursework in which learning occurred through team-based problem-solving and fieldwork. Other ideas offered for discussion included a proposal that graduate students and faculty receive formal training in teaching technique, and that MIT consider tapping into research staff and the alumni/ae community as additional teaching resources.

After listening to the exchanges, President Vest said, "I was struck by the fact that, as these groups talked about what they think we need to do to build an undergraduate educational culture that stimulates and enhances

excellence in education, they were talking about things we do as a matter of routine in our research culture. Maybe one of the things we can do is to break down distinctions between education culture and research culture. Perhaps we should be talking about integration between these two cultures as a way to improve education."

"The thing I'm worried most about is the scarcity of faculty time to devote both to teaching in general and to educational innovation," said Mr. d'Arbeloff (SM 1949), chair of the MIT Corporation. "But there's got to be an answer. If we don't now have enough time, money or means to pay attention to our students, our future

depends upon figuring out how much it would take."

The first hour was devoted to presentations by four MIT faculty members, an expert on teaching and learning from the University of Minnesota and an MIT PhD candidate. They were Class of 1922 Professor Harold Abelson of electrical engineering and computer science; Lori Breslow, senior lecturer at the Sloan School; Associate Professor Mitchell J. Resnick of media arts and sciences; Associate Professor Ian A. Waitz of aeronautics and astronautics; Karl Smith, a professor of civil engineering at the University of Minnesota; and Rebecca Goldin, who

will receive the PhD in mathematics at Commencement.

Before the participants broke into eight groups to discuss their own ideas and those offered in the presentations, they were asked to ponder two questions: (1) What is needed to strengthen education at MIT? and (2) What specific projects or efforts can be implemented in order to meet those needs?

RECURRING THEMES

The committees reported on their findings during the final hour. In noting the recurring themes among the groups, Chancellor Bacow said, "The sociologist in me wants to ask, 'Why did that happen?' Was it because of the way the issues were framed by our presenters? Was it because there is already considerable agreement on the approaches we need to take to improving education at MIT?"

He cited the following themes:

- Think big, and work for genuine cultural change. "If we think in incremental terms, then we will be squandering our resources and have little to show for our efforts."
- Find ways to encourage and support more active engagement of students in the process of their own education.
- Embrace opportunities for "discovery-based" learning, i.e., field camps, practice schools and competitions. "We should strive through these and other means to bring the real world into the classroom and take the learning process into the real world."
- Broaden the teaching base by provid-

ing formal training in teaching to graduate students, and perhaps by making use of research staff and alumni/ae.

● Create learning spaces on campus that are better suited to an innovative curriculum.

● Assess every new venture. "We should not undertake any new initiatives unless we know in advance how to assess their impact on students and the learning the process."

"What we did not hear was also interesting," he said, noting that technology was not mentioned, "showing that while new technology may have helped raise some of the issues, or may aid in the implementation of change, the focus is on learning and teaching."

Little mention was made of graduate education, although aspects of graduate education seem to be relevant to the discussion. These include learning in small, task-oriented teams; direct interaction with faculty and the coupling of research and learning.

"We also didn't hear much about lifelong learning and 'just-in-time' learning even though those are hot areas for development of educational innovation," added Woodie C. Flowers, the Pappalardo Professor of Mechanical Engineering.

The principles and proposals generated by the charrette will be turned over to a grants selection committee chaired by Chancellor Bacow. The committee will solicit and provide funding for projects designed to foster excellence and innovation in education at MIT.

Memorial for Coffin June 12

A memorial service will be held for retired engineer James B. Coffin Jr. on Saturday, June 12 at 11am at the Eliot Church in South Natick. Mr. Coffin, 63, died in Nokomis, FL, on April 7 after a long illness.

Mr. Coffin came to MIT's Aerophysics Laboratory in 1954 as a Northeastern University engineering co-op student and spent 20 years at the laboratory's wind tunnel before joining the Francis Bitter National Magnet Laboratory in 1975 as an assistant plant engineer.

In 1979, Mr. Coffin became the laboratory's plant engineer, responsible for the operation of its high-magnetic-field facility, where experiments were performed in 1982 that garnered the 1998 Nobel Prize for physics. Mr. Coffin, who graduated from Northeastern in 1959, retired in 1996.

Mr. Coffin is survived by his wife, Ann, of Nokomis and Falmouth, MA; three daughters, Trudy Campbell of Marlboro, MA, Teri Cioffi of River Edge, NJ, and Tracy Coffin of Gastonia, NC; and one grandchild.

Contributions in Mr. Coffin's memory may be made to the American Cancer Society.

Awards & Honors

Adjunct Professor **Joseph Haldeman** of the Program in Writing and Humanistic Studies has won his fourth Nebula Award from the Science Fiction and Fantasy Writers of America. His book *Forever Peace* (Ace Books), recognized as best novel, also won a Hugo Award. Mr. Haldeman is one of science fiction's most eminent writers; he has won five Hugos, three Nebulas and one World Fantasy Award. His earlier novel *Forever War* is considered one of the genre's landmark works.

The Rockefeller Foundation has granted Assistant Professor **Thomas DeFrantz** a summer residency to work on his book *Revelations: Alvin Ailey's Embodiment of African American Culture* at the Bellagio Study and Conference Center in Italy. Professor DeFrantz has been the archivist and coordinator of the dance history program for the Alvin Ailey American Dance Theater.



DeFrantz

Professor **Charles C. Ladd** of civil and environmental engineering has received the 1999 Karl Terzaghi Award from the American Society of Civil Engineers. The biennial award, the organization's highest honor in geotechnical engineering, cites Professor Ladd's "decades of innovative research dealing with the strength properties of soft clays and consultation on projects involving structures placed on such soils."

The **Security Studies Program (SSP)** recently received a two-year, \$800,000 grant from the Carnegie Corporation, which makes grants in four areas: education, international peace and security (the category in which SSP received its grant), international development, and democracy/special projects. The SSP, based at the Center for International Studies, focuses on grand strategy, technology, arms control and bureaucratic politics issues.

Other obituaries

HENRY BELDING

Henry Belding, 68, of Nashua, NH, a former senior stock clerk at Lincoln Laboratory, died on April 26. He retired in 1992 after 39 years with MIT. Survivors include three daughters, Joanne Eldredge of Kennebunk, ME, Dorren Belding of Medford and Patricia Sullivan of Broken Arrow, OK; two sons, Henry Belding Jr. and Charles Mulik of Wilmington, MA.

GEORGE A. MacLEOD

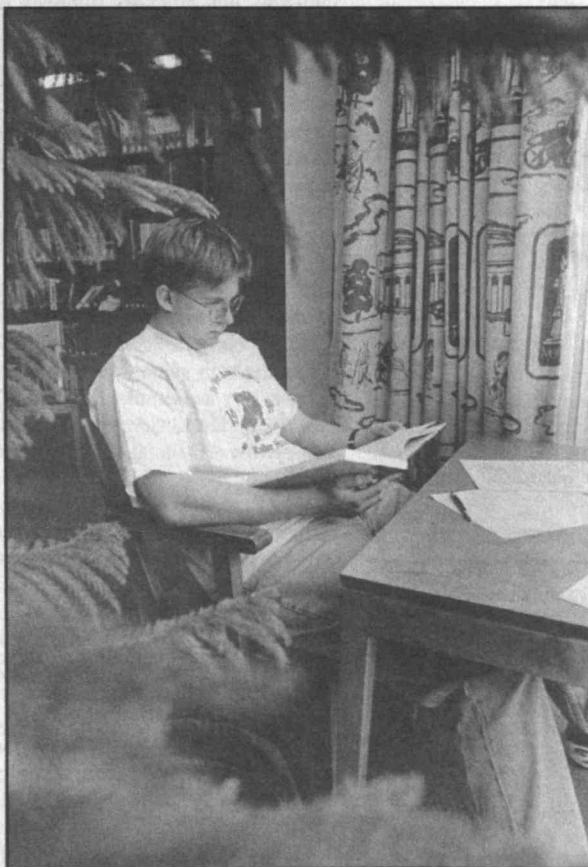
A funeral was held on February 26 for George A. MacLeod, 72, of Watertown, a former senior stock clerk at Lincoln Laboratory who died on February 17. He was hired in 1968 and retired in 1990. Mr. MacLeod is survived by his wife, Mildred; a daughter, Ethlyn I. Freda of Billerica; a son, George A. MacLeod III of Laconia, NH; three sisters, Helen Campbell, Dorothy Leonard and Edith Hardy all of Somerville; and three grandchildren. He was buried in Ridgelawn Cemetery in Watertown.

PAUL J. STRATFORD

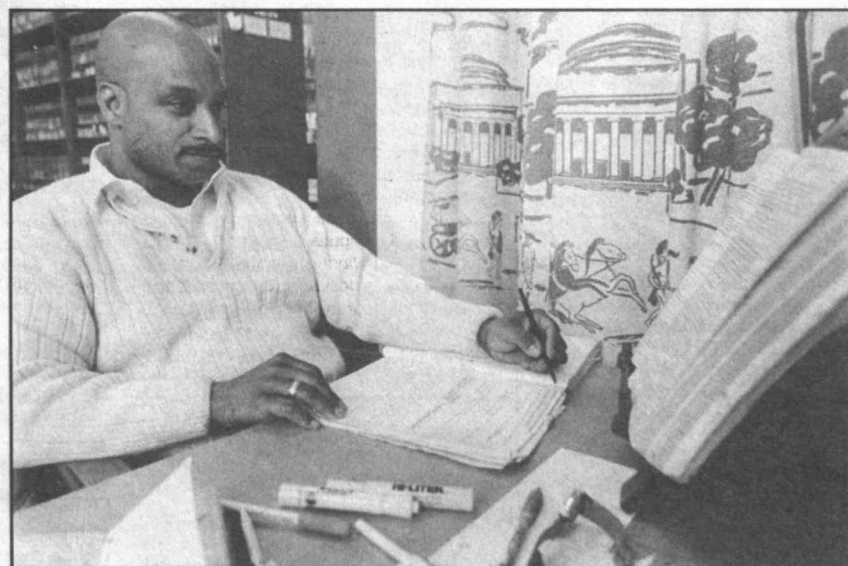
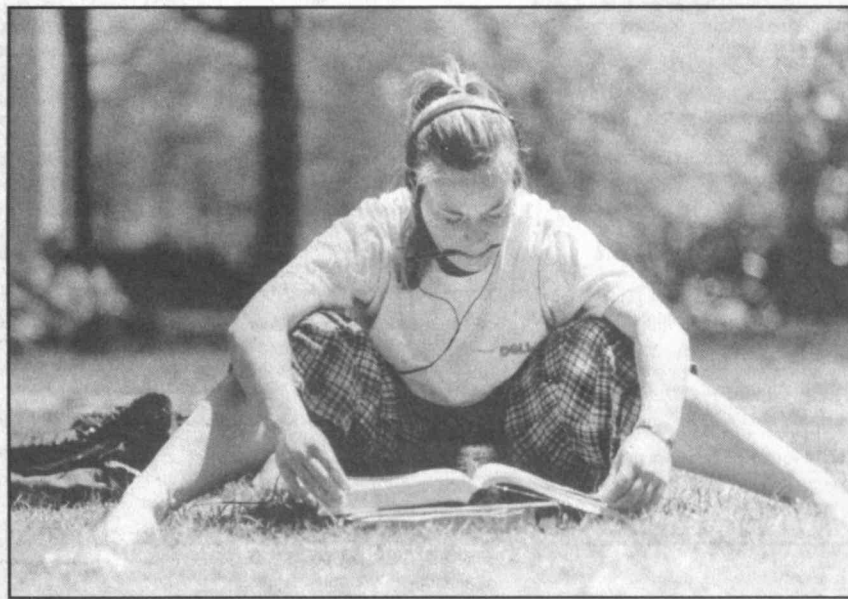
A funeral Mass was said at Sacred Heart Church in Lexington on February 24 for Paul J. Stratford, 83, of Woburn, who died on February 21. He was a former Campus Police patrol officer who retired in 1978 after working at MIT for 15 years.

Mr. Stratford is survived by his wife, Irene; two sons, Paul Jr. of Lexington and Stephen of Needham; two daughters, Sheila Savits of Pittsburg, PA, and Regina Henneberry of Lexington; a sister, Phylis McDermott; and 13 grandchildren. He was buried in Westview Cemetery in Lexington.

Hitting the books



As finals approach, students get in some studying. Ben Hough, a sophomore in physics (above) and Dan Muhammed, a graduate student in economics (bottom right) prefer the Science Library, while freshman Paige Hopewell (top right) does her reading—and listening—on Killian Court.



Photos by Donna Coveney

MIT experts guides available

Guides to MIT experts on medically related research and on the environment are available through the MIT News Office.

The 1997-98 MIT Media Guide to Experts on Medicine, Physiology and Health features research descriptions and contact information for almost 200 MIT faculty and scientists involved in research ranging from aging to laser medicine to Z-DNA.

The MIT Media Guide to Experts on the Environment, published in 1995, features some 100 researchers working in fields ranging from air pollution to waste remediation.

The cross-indexed guides are available to members of the media and the MIT community. To obtain a copy, contact Myles Crowley of the News Office at x3-2700 or <mcrowley@mit.edu>.

Six at Sloan receive new award funded by McGovern

Patrick J. McGovern Jr. (SB 1959), an MIT Corporation member and a world leader in computer publishing, returned to MIT May 5 to present the first Patrick J. McGovern Jr. Award to six graduating students of the Sloan School of Management for their efforts in advancing entrepreneurship during the past year.



McGovern

The presentation took place at a reception at McCormick Hall prior to the 1999 \$50K Entrepreneurship Competition ceremony.

The McGovern award will be given each year to an individual or team, working closely with the MIT Entrepreneurship Center, who made a significant impact on the quality and overall spirit of entrepreneurship at the Institute.

This year's winners are Rohini S. Chakravarthy, Ramzi M. Nassar, Laurea Dorvial Paglione, Joel R. Serface, Rodridge L. Soares and Jeffrey S. Williams. The six graduating MBA students received the award for their outstanding leadership of the MIT/Sloan Venture Capital Investing Club, which created the inaugural MIT/Sloan Venture Capital

Conference in December 1998. Each student received a \$1,000 prize.

Mr. McGovern also made a \$4,000 gift to the Entrepreneurship Center for a total 1999 contribution of \$10,000. He intends to maintain the award as an annual event.

Mr. McGovern received the SB in biology in 1959. Five years later he founded International Data Group. Today, IDC includes more than 300 publications, including Computerworld and PC World.

In his remarks, he emphasized the importance of being prepared to compete in entrepreneurship immediately after graduation, and he praised MIT for setting the standard for combining business and the sciences, now and in the past.

"The preparedness of the would-be entrepreneur today is so much better than in past generations," he said. "As a result, the likelihood of success in business is much higher now." He cited his own experience: starting a freshman guide because there was a need for one, and doing it without any financial support from MIT. Instead, he recruited a team of co-founder/investors and soon made the guide profitable from the advertising revenue of companies wishing to reach the tight freshman market.

"I enjoyed the process," he told the students and faculty. "It got me into publishing."



A panel discussion examining "Brick and Mortar Versus Web-based Commerce" at the MIT Sloan E-Commerce Awards event featured (left to right) Christopher Lochhead of Scient, Jared Shutz of Blue Mountain Arts, Robert Hedges of Fleet Bank, David Berlind of ZDnet (moderator), Richard Owen of Dell Computer and Jeff Bennett of Lycos.

Photo by Mark Ostrow

Firms honored at e-commerce awards

A stellar list of who's who in electronic commerce, including industry leaders and MIT faculty, gathered last week in Wong Auditorium to recognize innovative business models and technologies at the first annual MIT Sloan E-Commerce Awards.

Most striking was the cross-section of winners; some companies re-invented an industry, while others

created new paradigms. MP3.com (<http://www.mp3.com>) was awarded the Re-Inventor Award for playing an intricate role in changing the way the music industry operates. The San Diego firm upheld its irreverent image by having its award accepted by a local band that can distribute music because of MP3.

"Since we play R&B, blues and swing, record companies keep telling us we're all over the map and to pick one style. But our fans love our music; they just can't buy it in record stores," said one of the Buck Dewey Band members. "By distributing our music, MP3.com is at the forefront of what can perhaps allow us to become the next Duran Duran."

Egghead.com of Spokane, WA (<http://www.egghead.com>) won the Web Transformation Award for most effectively transforming an established brick-and-mortar retailer into a web-based business. Egghead Software closed its stores and now operates as [egghead.com](http://www.egghead.com), an exclusively online retailer that sells more than 40,000 hardware and software products and accessories.

WORLD WIDE WINNER

The Internationalist Award went to Austin, TX-based Dell Computer Corp. (<http://www.dell.com>), which has online stores that are customized for 44 countries and cover 21 languages.

"Four years ago, Michael [Dell] said the Internet will change business. I was not as convinced as he was and thought, 'How could you sell computers on the web when you need a computer to buy a computer?'" said Richard Owen, vice president of Dell Online Worldwide. "Once again he was correct."

Net Perceptions from Minneapolis (<http://www.netperceptions.com>) received the Technology Innovator Award for its real-time recommendation technology—software that gathers information about individual users and then allows companies to personalize their offerings to each online customer.

Akamai (Hawaiian for intelligent, clever and cool), an Internet content distribution service in Cambridge at <http://www.akamai.com>, captured the Rookie of the Year Award for showing the greatest potential to dominate new industries. Founded in 1998 at MIT and opened for business last spring, Akamai's FreeFlow service speeds up the delivery of content-rich web pages and helps solve congestion problems facing popular e-commerce sites.

SOCIAL RESPONSIBILITY

Keeping in mind that e-commerce is also a vehicle for social change, the awards ceremony rewarded a company or organization that has most effec-

tively shown the potential to improve people's lives. Impact Online (<http://www.volunteermatch.com>) of Palo Alto, CA, won the Socially Responsible Award for its web-based service VolunteerMatch, which pairs volunteers with nonprofit organizations. To date, more than 4,000 nonprofit organizations have used VolunteerMatch to recruit approximately 1,000 volunteers per week.

BEGINNINGS

The concept of an awards program developed after Sloan became the first top-10 business school to launch an electronic commerce and marketing program. Three months ago, the awards ceremony was merely an idea proposed by a few Sloan MBAs. Since then, nearly a dozen corporate sponsors signed on and at least 35 students became involved.

In his opening remarks, Sloan Dean Richard Schmalensee said, "I am deeply impressed with your expertise and experience and particularly with the innovation many of the companies represented here this evening have displayed in exploiting this exciting new channel: the Internet and the World Wide Web."

Assistant Professor Nader Tavassoli, co-director of Sloan's electronic commerce and marketing track, commended both students and guests for being part of such an extraordinary event. "Instead of merely recognizing web pages, we are honoring companies who have successfully implemented their business models through the web. We are talking about the way the web is used to best serve the customer," he said.

The e-commerce track, which will begin in fall 1999, is already expected to be the largest track at Sloan. Of the 350 MBA students, 70 will be in that track next year, with 140 expected for the following year.

Entries (more than 200 in the six categories) were accepted exclusively via the awards web site at <http://www.mitawards.org>. The list of five finalists in each category, along with a comprehensive research report on each company, was submitted to a jury that included e-commerce company founders Bill Porter of E*Trade and Shikhar Ghosh of Open Market.

Before the presentation, David Berlind, editorial director of Business Computing at ZDNet, led a panel discussion examining "Brick and Mortar Versus Web-based Commerce."

Panelist Jared Schultz, executive director of Blue Mountain Arts, Inc., said, "Blue Mountain has been an offline company for 30 years. As an online venue, we are the number-one force in electronic greeting cards with 80 percent of the market. Companies that see the Internet as a threat and not as a new channel will be sorely disappointed."

Classified Ads

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INSTRUCTIONS: Ads are limited to one (of about 30 words) per issue and may not be repeated in successive issues. Ads may be re-submitted after skipping a week. Ads/renewals are not accepted via telephone or fax. All must be accompanied by full name and extension (or proof of MIT affiliation).

- E-mail address (return address must be mit.edu): <ttads@mit.edu>
- Interdepartmental/Walk-in address: Calendar Editor, Rm 5-111.

Please note that all Tech Talk ads are provided to the Internet on the date of publication, which makes them accessible world-wide.

All extensions listed below are campus numbers unless otherwise specified, i.e., Dorm, Lincoln, Draper, etc.

MIT-owned equipment may be disposed of through the Property Office.

Deadline is noon Friday before publication.

FOR SALE

Furniture sale, dining table/6 chairs, king headboard/frame, F-sz 4-poster bed, love seat, elegant walnut chair, more. Caroline x3-3630 or Sat. 5/22 moving sale 38 Park St. #1 Brookline 9-12.

Living room set, \$350; daybed w/pillow & covers, \$150; white Formica dinette w/6 chairs, \$150; F-sz mattress, \$50; lots more. Rita x3-6337.

Romantic, white, long-sleeved wedding gown w/full skirt & beautiful, unique train, fits sz 10, incl petticoat & veil, \$600. Bill x3-2776 or Lauren 978-342-8737.

14' blue Great Canadian Adirondack fiberglass canoe, 42" wide beam, flat bottom, extremely stable, two built-in padded vinyl seats, like new, \$350. Lisa, 617-776-8896.

Quality double bed, <2 yrs old, w/boxspring, \$180; nice loveseat, blue w/white stripes, \$80. Call 536-4460.

Palm Pilot professional organizer, still in shrink wrap, won in raffle, \$100, retails for \$199. Call Draper x8-1619, cjoncill@draper.com>.

M's racing bike, Cannondale 3.0 Road Race Series, royal blue, alum, 14-sp, 23" 58cm Suntour shift-

ing, made in US, Wellgo pedals, \$180. Laura 617-547-0564 eves or <laura@mit.edu>.

We're moving and have a cast iron, white enamel, old-fashioned deep bathtub free for the taking; also Maytag gas dryer in grt cond, \$75. Email <tash@mit.edu>.

Computer desk w/monitor stand, chair, \$60; armoire w/hanging rod & shelf, \$80; Sony Camcorder w/manual, batteries, charger, TV/VCR cable, \$100. Call x3-6840 or <carlson@mit.edu>.

Ice cream maker, Rival, 6-qt electric, never used, in box, \$25. Call x3-9411.

Walnut bedroom set w/Q-sz headboard, 2 mirror L's dresser, M's dresser, & night table; large set, 25 yrs old, Danish modern, gd cond, can deliver, \$275. Tom King, Draper x8-2191.

VEHICLES

1988 Audi sedan, auto, gray velour interior, white ext, ski bag, rear headset jacks, 143K, well-maint, gd cond, \$2100 or bst. Contact x3-3566, 508-431-1200, 401-276-6509.

1990 Toyota Corolla DX, auto, FM/AM/cass, 84K, \$2700 or bst. Call x8-7131 or 617-527-8724 eves.

1991 Volvo, only 30K, ABS, ps, auto, driver-side airbags, exc cond, silver gray w/black leather interior, \$10K or bst. Call 868-2938 or <achou@mit.edu>.

1992 Mercury Sable, GS Wagon, white on cinnamon (tan), ABS, 3.8 liter engine, all power, 3rd seat, rear wiper, all records, 65k miles, \$4,900 or bst. Willy, Linc x7466 or <wgilson@LL.mit.edu>.

1993 Ford Escort SE, 2-dr, auto, a/c, alarm, AM/FM/cass/CD, ps, alloy whls, new brks, gd cond, clean, well-maint, 59K, \$4500 negot. Contact: <smcaldas@mit.edu> or 617-625-9953 (pm).

1994 26-foot Sandpiper 5th wheel camper, slps 6, fully-equipped (include a/c, stereo, microwave, etc.), exc cond, \$9500. Call 508-349-6737.

HOUSING

Arlington: 2BR, 1b, LR for rent in single-family house, quiet area, \$500/ea or \$900/both, include utils. Call 781-643-3390.

Arlington Ctr: fully furn 1BR condo, secure elev bldg, nice vw, off-st prkg, all utils & fees include, avail 6/1, \$1000/mo. Call 781-769-4882.

Belmont: non-smkg roommate to shr w/single mom & teen daughter, cats, in 3.5BR+ 2-fam hse, laundry, yd, prkg, 2 BR poss, pet ok (no dogs), \$600-700/mo. Karen <kej@psfc.mit.edu>, x3-7232.

Cambridge: summer sublet, Central Sq, 2BR furn apt w/ktchn, bath, prkg, 3 min from T, windows, quiet, coin Indry, avail Jun 1-Aug 31, \$660/mo. Call 497-4134, <lissette@mit.edu>.

Cambridge: Lee St., 1BR furn, complete w/all utils, tel/fax/data line, 1st fl unit w/porch, sm garden, quiet, avail short or long-term, reasonable. Contact <janiscka@mit.edu> or 617-547-0745.

Cape Cod, Wellfleet: 2BR (slps 5) cottage on priv rd, short walk to bay beach, nr bike trails, deck, BBQ, cable/VCR, avail May, June 12-19, Sept, \$500/wk. Call 617-332-7104.

Lexington: fully-furn house avail for rent July 11-Aug 8, \$2500 + utils. M. Zahn, x3-4688, <zahn@mit.edu>.

Summer sublet: XLG 1BR apt, LR, DR, W/D, grt loc, 1 mi to Hvd Sq, on bus line, easy prkg, avail June-Aug, \$1200 incl utils. Call 617-868-3675.

Truro: wonderful, secluded 3BR, 2b house (porch, fp/ce) on hill overlooking water, weekly \$1200-1500, May 15-Sept 15. Call x3-3461 or <alcohen@mit.edu>.

WANTED

Prof, resp, non-smkg F seeks house-sitting opportunity, will care for plants, etc, exc MIT recommendations avail. E-mail <myer@gis.net>.

Looking for trigonometry/geometry or expository writing tutor for advanced high school student, starting June 4th through summer, on campus, \$15/hr. Call 876-5913.

Sewing machine wanted suitable for performing simple tasks, cheap or for free. Anna 868-8250.

Wanted: wooden dining table & chairs for 6 persons, gd cond. Contact <bono@mit.edu>.

For Aug. 1: 2-3BR apt, condo, or home for 2 adults, 2 children & 1 indoor cat (v clean), <\$1,000/mo, willing to do caretaking or repairs for lower rent. Contact <jsacco@ou.edu> or 405-360-0980.

ROOMMATES

Cambridge/Watertown: seek 3rd M roommate for furn duplex, own BR, share ktchn/bath, w/d, 5 min walk to market & bus, 10 min to Hvd Sq, \$350/mo, utils include. Call 617-864-9051.

Event celebrates 25 years of computer music innovation

■ By Nyssim Lefford
Media Arts and Sciences

On Friday, May 21 at 8pm, the Media Laboratory will host "Digital Rewind," a concert featuring important works of experimental computer music, in commemoration of the founding of MIT's Experimental Music Studio (EMS) 25 years ago.

The free concert in Kresge Auditorium will conclude an international symposium honoring the contributions of the composers and music researchers associated with the EMS. The evening's performances will include two world premiere pieces: a reworking of *At Last...Free* for Max Mathews' Radio Baton by Richard Boulanger and an interactive rendition of *Synapse* for viola and computer by Professor Barry Vercoe. For more information, call x3-2727 or see <<http://www.media.mit.edu/EMS/>>.

Known as one of the most innovative research facilities in the field of experimental music, the EMS contributed several seminal compositions to the genre of computer music, some of which will be performed at the May 21 event. The concert will include works by internationally recognized composers who worked at the EMS: William Albright, Richard Boulanger, Professor Peter Child, James Dashow, Mario Davidovsky, Associate Professor Tod Machover, Jean Claude Risset and Professor Vercoe.

The performance will also feature some of the most celebrated musicians in experimental music, including members of the Boston-based Collage New Music, Professor Marcus Thompson (viola), David Horne (piano) and Curtis Macomber (violin). Examples of the technology developed at the EMS and the Media Lab will be on exhibit in Kresge's lobby before the performance. Doors to the exhibit will open at 7pm.

WORLD PREMIERES

Both premieres on the concert program feature innovations in music technology. Professor Vercoe's work *Synapse*, composed in 1976 for violist Marcus Thompson, treated both musician and computer-synthesized accompaniment as equally salient musical entities.

When the piece was written, technological limitations placed the burden of synchronization during performance on the musician. Now, modern digital processing techniques offer more creative possibilities and have enabled composers to incorporate real-time synchronization and genuine computer interaction into their compositions. In early 1999, Professor Vercoe revisited *Synapse* to explore the interactive potential of this important work.

"When you have a technology that enables composers and performers to do new and different things, that will always excite the imagination," said Professor Vercoe, likening modern advances in signal processing to the development of musical instruments with responsive control such as valved trumpets.

Professor Vercoe noted that while his compositions use the latest technologies, they are human-driven. "I've always been in love with the live aspects of music and see them as an extension of natural body motion," he said. "There's a contribution that humans do make, either through vocal chords or tactile control or whatever, that is an essential human communication."

Richard Boulanger's *At Last...Free* features Max Mathews's "radio baton," a device that tracks the motions of two conducting batons in three-dimensional space. The position and movement of the batons are converted into MIDI (musical instrument digital interface) data, which are sent to a computer that



Professors Barry Vercoe and Marcus Thompson working in front of a graphical score editor, circa 1976.

modifies a score in real time with the conductor's movements. In honor of the EMS's 25th anniversary celebration, MIT commissioned Dr. Boulanger to rework this exceptional composition.

THE EMS

Founded by Professor Vercoe at MIT in 1973, the EMS was the first facility to have digital computers dedicated to full-time research and composition of computer music. Committed to moving technology forward in artistic ways, the EMS

hosted the first International Conference on Computer Music in 1976.

During its first 12 years, the EMS was responsible for developing or advancing computer-based music technology such as real-time digital synthesis, live keyboard input, graphical score editing, synchronization between natural and synthetic sound in composition and advanced computer languages for music composition. The prevailing musical aesthetic at the EMS encouraged explorations into the interaction between live performers and computer ac-

companists.

In 1985, Professor Vercoe became one of the founding faculty members of the Media Lab, where he has directed research groups on music and cognition, synthetic listeners and performers, and machine listening. His own research interests span music theory, signal processing, music perception and audio coding. He is the inventor of several computer languages for digital music synthesis that have been used by thousands of composers around the world.

Ravishing radishes



Radishes On Nana's Dish is one of several paintings in *On the Table*, a series by Susan Livada, on view at the Dean's Gallery through June 17.

Indian musicians to perform at MIT

On Sunday, May 23, Indian violin virtuoso Dr. L. Subramaniam and Pandit Vishwa Mohan Bhatt, creator of the mohan veena (a stringed instrument), accompanied by Mahesh Krishnamurthy (mridangam) and Sandip Das (tabla), will perform a benefit concert at 4pm in Kresge Auditorium.

Proceeds from tickets (\$100, \$50, \$30 and \$20) will benefit AID-Boston (Association for India's Development), which supports 22 projects in 13 Indian states for literacy, education, health care, rural development, population control, social welfare and women's empowerment.

Dr. Subramaniam has played professionally since he was six, having trained in both Western and Indian classical traditions. He blends the melodic and rhythmic richness of his native idiom with the contrapuntal and harmonic progressions of European music. He has been honored with the prestigious Padmashree award from the Indian government. Mr. Bhatt's pure and delicate yet fiery music was featured on his album with Ry Cooder, *A Meeting By the River*, which won a Grammy in 1994.

For more information, call 864-6132 or see <<http://web.mit.edu/aid-boston/www/>>.

Art Quote

"I think what artists often do as a function in society is show engineers new ways of doing things—creative things. Engineers like to feel they're creative too, but they must realize that artists are creative in a different way. Perhaps only artists know how to push the limits of devices and thereby engender a rethinking of how they can be used."

—Professor Barry Vercoe

Institute Arts

For more arts-related information call the 24-hour hotline at 253-ARTS or consult the World Wide Web at <<http://web.mit.edu/arts/>>.

* Open to public
** Open to MIT community only

May 19-June 6

■ MUSIC

"Digital Rewind" Concert*—May 21. Celebrating the 25th anniversary of the founding of MIT's Experimental Music Studio (EMS), innovators in the field of electronic music. Includes world premieres of interactive compositions which have been reworked and revised for this event. Pre-concert exhibit in Kresge Lobby, 8pm, Kresge Aud. x3-2727 or <<http://www.media.mit.edu/EMS/>>.

Student Vocal Recital*—May 22. Performances by students of Affiliated Artist Margaret O'Keefe: Susan Rushing '99, Tara Rosenberger (G), Christian Patrickson (G) with accompanists Peter Hussami '99 and Jennifer Bonnelly '01. 6pm, Killian Hall. x3-2826.

CANCELLED—Ganesh and Kumaresh, South Indian violin*—May 22. Presented by MITHAS (MIT Heritage of South Asia) and the New England Hindu Temple (NEHT). x8-7971 or <<http://web.mit.edu/mta/mithas/>>.

Benefit Concert*—May 23. Dr. L. Subramaniam (violin) and Pt. Vishwa Mohan Bhatt (mohan veena) with Mahesh Krishnamurthy (mridangam) and Sandip Das (tabla). Sponsored by AID-Boston (Association for India's Development), which currently supports 22 projects in 13 different states in India in literacy, education, health care, rural development, population control, social welfare and women's empowerment. Tickets: \$100, \$50, \$30, \$20. 4pm, Kresge Aud. 864-6132 or <<http://web.mit.edu/aid-boston/www/>>.

■ EXHIBITS

List Visual Arts Center* (E15): *Eve Andrée Laramée: A Permutational Unfolding*. New installation by the NY-based artist explores the history of digital technology. *Landscape: Outside the Frame*. Works by contemporary artist collaborative the Ctr for Land Use Interpretation (CLUI) & artists Olafur

Eliasson, Jacqui den Hartog, Peter Minchell & Olaf Nicolai.

MIT Museum* (N52): *Flashes of Inspiration: The Work of Doc Edgerton*. Long-term installation celebrates the life and work of Prof Harold ("Doc") Edgerton (1903-1991), whose work with stroboscopic light redefined photography. Doc first came to MIT as a graduate student and remained for 60 years, as professor in the Department of Electrical Engineering and Computer Science. **Ongoing Exhibits.** *Gestural Engineering: The Sculpture of Arthur Ganson*; *LightForest: The Holographic Rainforest*; *Holography: Artists and Inventors*; *MIT Hall of Hacks*; *Light Sculptures* by Bill Parker; *Math-in-3D: Geometric Sculptures* by Morton C. Bradley, Jr.; *MathSpace*. 265 Mass Ave. Tues-Fri 10-5, Weekends 12-5. x3-4444.

Hart Nautical Gallery—*Deep Frontiers: Ocean Engineering at MIT*. Long-term exhibit exploring the latest advances in underwater research. Opens March 19. *Ship Models: The Evolution of Ship Design*. Ongoing. Daily 9am-8pm. x3-5942.

Compton Gallery: *New Craft Technology*. Architectural work by James Carpenter Design Associates, Fernando Domeyko,

Polshek Partnership, and Rafael Vinoly Architects, which all use the technical design and fabrication work of Tim Eliassen with TriPyramid Structures. Exhibition organized by Fernando Domeyko, senior lecturer, architecture. Through June 6. Compton Gallery (Rm 10-150). Weekdays 9-5. Special Weekend Openings 12-5pm: May 22-23, May 29-May 30, June 5-6. x3-7791.

The Dean's Gallery—*On the Table*. Oils on canvas by Susan Livada. Through June 17. The Dean's Gallery, Sloan School of Management, E52-466. Weekdays 9-5pm. x3-9455 or <<http://web.mit.edu/deans-gallery/www/>>.

Wiesner Student Art Gallery: *Schnitzer Prize Winners' Exhibition*. Featuring the three student winners of the 1999 Schnitzer Prize in the Visual Arts. First place: Richard R. Fletcher (G); Second place: Matthew D. Hollingworth (G); Third place: Vince E. Carballo (2000). May 10-June 10. Wiesner Student Art Gallery, Stratton Student Center. x3-7019.

Women's Studies. Permanent exhibition of archival photographs documenting the role of women at MIT over the decades. Rm 14E-316. x3-8844.

Strobe Alley—*Never Stop Learning: The Life and Legacy of Harold Edgerton*. Photographs, instruments and memorabilia documenting the life of Harold Edgerton, inventor of the strobe light. Bldg 4, 4th floor corridor. x3-4444.

Religious Activities Center—*Jerusalem from the Air*. Aerial photographs by former Israeli Air Force pilots Doby Tal and Moni Haramati offer a modern perspective of an ancient city, focusing on the holy sites that tie the city to three religions. Sponsored by MIT Hillel. Through June 30. W11 Small Dining Rm. Weekdays 9-5pm. x3-2982

■ OTHER

Hybrid New England/Finnish Sauna*—Through May 20. Project by architecture graduate student Pia Lindman. Funded by the Council for the Arts at MIT, Saunatec, State Committee of the Arts, Finland. Next to Chapel, 12-6pm Tues-Sat. 547 9542 or <plindman@mit.edu>.

Applications for Wiesner Student Art Gallery** All students welcome to apply to put up an exhibit. x3-7019.

Dome transformed into likeness of R2D2

(continued from page 1) sometimes the rest of the world). The people responsible are seldom identified. The stunt continues the MIT tradition of hacking, perhaps best exemplified five years ago when what looked like an MIT Campus Police cruiser appeared at the top of the Great Dome.

The fake police cruiser, complete with a dummy dressed as a uniformed officer, flashing lights, a toy gun and a box of donuts, appeared on May 9, 1994. The car turned out to be the metal outer shell of a Chevrolet Cavalier attached to a multi-piece wooden frame, all carefully assembled on the roof over the course of one night.

Local TV stations covered the police car hack and the segment was picked up by network news broadcasts. The story appeared in newspapers in California, Israel, Korea and points between. It was probably the most successful hack ever perpetrated.

Other memorable hacks from the past:

- Marking off the length of the Harvard Bridge in 5-foot, 7-inch segments known as Smoots, celebrating the stature of Lambda Chi Alpha pledge Oliver Smoot Jr. The Smoot markers, first painted in 1958, have been renewed regularly for 41 years as the paint fades. (The bridge measures 364 Smoots and

one ear.)

- A weather balloon popped up at midfield and self-destructed during the 1982 Harvard-Yale game. Members of Delta Kappa Epsilon took credit for this prank.

- An MIT banner shot out of the sod and draped around a goalpost as Yale prepared to kick a field goal during the 1990 game at Harvard.

- On Oct. 15, 1990, Charles M. Vest's first day as MIT's president, the door to his office was hidden behind a poster-covered bulletin board carefully constructed to fit into the entryway. A bottle of champagne was placed in the office. "My first major policy is that we're going to keep that," President Vest said. "The first time issues get hot on campus, we'll pull it out."

- The Oscar won by *Good Will Hunting* on March 24, 1998 was celebrated by arranging the lighting in the Green Building to depict a 16-story, 185-foot-tall image of the statuette.

- On April Fool's Day 1998, a story appeared on the MIT home page announcing the acquisition of the Institute by the Walt Disney Co., with an illustration of Mickey Mouse pointing to the Dome decorated with mouse ears. "I knew it was a hack as soon as I saw the price," said MIT spokesman Ken Campbell. "Only \$6.9 billion? Much too cheap!"

Midnight snack



Kathryn Willmore, vice president and secretary of the corporation, serves a pancake to freshman April A. Deet at the Final Exam Pancake Study Break in Lobdell from 10pm-midnight on Sunday. Professor of Music Ellen Harris (second from left) and Dean of Students and Undergraduate Education Rosalind Williams (second from right) were also among the members of the faculty and administration who turned out to serve pancakes on the night before final exams began. More than 1,000 students partook of the late-night pancakes at the event, which was suggested by Sgt. Cheryl deJong Vossmer of Campus Police "to let the students know we really care about making a difference for them," she said. Organizers hope to make the event—supported by the President's Office and ODSUE and staffed by Aramark, ODSUE and MIT Campus Police—an annual tradition.

Photo by Gábor Csányi

Martinos gift to fund biomedical imaging center in HST

(continued from page 1) cally improve the approach to scientific inquiry and clinical management. This center, to be located on the MIT campus, will help define the future of imaging well into the next century," President Vest said.

Thanassis Martinos said, "It is a great privilege to support the Harvard-MIT Division of Health Sciences and Technology in this ambitious effort. Our goal is to make a meaningful contribution that will advance our understanding and treatment of disease." He and his wife, Marina, have the controlling interest in Eastern Mediterranean Maritime, a major shipping company, as well as significant real estate holdings in Greece.

'SEEING' INSIDE THE BODY

One type of biomedical imaging is magnetic resonance imaging (MRI), which utilizes nuclear magnetic resonance (NMR) technology. Using electromagnetic fields and radio waves to read minute shifts in the magnetic alignment of protons in soft tissue such as the brain, MRI involves the collaboration of engineers, computer scientists, neuroscientists and physicians.

The important advance called functional MRI (fMRI) shows how living tissues are functioning in real time. For example, fMRI can make a 100-millisecond scan every few seconds to detect variations in regional blood flow within the brain to signal sight, hearing, thinking or feeling. Com-

binning many fMRI scans makes a real-time "movie" of functioning organs that works like a flip-book. This breakthrough has been especially useful in cognitive neuroscience and psychology.

Current imaging research at HST that will be advanced by the Martinoses' gift include:

- NMR brain imaging, which helps physicians determine how best to save portions of the brain at high risk of damage from stroke or disease. A wide range of measurements of brain function have provided new ways to monitor experimental therapies and have allowed an unprecedented degree of rehabilitation to stroke patients.

This work at the Massachusetts General Hospital (MGH) NMR Center in Boston is headed by HST graduate and faculty member Dr. Bruce R. Rosen (SM 1984, PhD).

- Video-guided imaging, a technique used by neurosurgeons, provides a detailed picture of the brain superimposed on the actual skull of the patient, offering surgeons a previously unimaginable level of precision and detail.

With the system, a surgeon can tell the exact location of structures such as critical blood vessels and tumors. Because the video is live, the surgeon is able to watch his or her own hand on the monitor. As a result, the surgeon knows precisely where to make cuts.

At the heart of the system is software that allows precise alignment of images. "Our algorithm gives us a totally automatic way of taking a view of a patient, and taking a model of the 3D

internal anatomy of that patient, and exactly lining them up," said Professor Eric Grimson, an HST-MIT faculty member who leads this team in the Surgical Planning Laboratory of Boston's Brigham and Women's Hospital.

LONG RELATIONSHIP

The Martinoses' connection to HST goes back more than 20 years. In 1976, on a Friday afternoon, Mr. Martinos tracked down Dr. Daniel C. Shannon, who was then director of Pediatric Intensive Care at MGH and a member of HST's founding faculty.

Mr. Martinos asked Dr. Shannon, who was on vacation in Nantucket, to come to Greece to treat a desperately ill godchild. Dr. Shannon arrived in Athens on Saturday and, unable to identify the cause of heart and lung failure as well as coma, returned to Boston with the child the following day, taking the 10-1 odds against the child's surviving a flight to Boston. She was admitted to his MGH unit for diagnosis and treatment, and within two weeks the child was back in Greece. Today she is 26 years old and a graduate student. Thus began a long and deep friendship between Dr. Shannon and the Martinoses.

When their oldest daughter, Athinoula, died in 1997 at age 24, the Martinoses spoke with Dr. Shannon, who also had lost a daughter, about how he had dealt with his loss. One way Dr. Shannon coped was to establish a research scholarship fund for young women at his

daughter's college. Dr. Shannon suggested that the Martinoses set up the Athinoula A. Martinos Research Scholarship fund to support the research, study and training of HST students. The first 10 scholars were announced at the 1997 HST Research Forum.

Dr. Shannon and HST co-directors Martha L. Gray (the J.W. Kieckhefer Professor of Electrical Engineering at MIT) and Professor Joseph V. Bonventre of Harvard focused the Martinoses' interest on biomedical imaging, knowing the couple is interested in supporting work that could find answers to advance medical knowledge and develop innovative treatments for brain disease.

"The Martinos Imaging Center will be an important physical representation of HST's commitment to the solution of biomedical problems and improvement of human health by advancing imaging technologies that by their very nature integrate scientific and medical disciplines. We applaud the members of the Martinos family for their vision of the future of research at the interface of science, technology and medicine," Dr. Bonventre said.

"Imaging is still a young science," Dr. Gray said. "With the scientific and technological strengths of MIT, blended with the clinical strengths of Harvard Medical School and its affiliated teaching hospitals in Boston, we are confident that tremendous strides can be made in advancing this valuable technology."

Thousands prepare for Commencement

(continued from page 1)

persons receiving doctoral degrees at 1pm on Thursday, June 3 in Rockwell Cage.

Other speakers at this year's Commencement will include Brian J. Schneider, president of the Graduate Student Council, and Pooja Shukla, president of the Class of 1999. The invocation will be given by Rabbi Joshua M. Plaut, MIT's Jewish chaplain.

According to Professor Eric L. Grimson of electrical engineering and computer science, chair of the Commencement Committee, Friday's formal activities will begin at 9:45am with the traditional academic procession. It will leave from the 77 Massachusetts Avenue entrance to the Institute, moving south for a short distance and then east on Memorial Drive to Killian Court. The procession will be led by the chief marshal, John Morefield, 1998-99 president of the MIT Association of Alumni and Alumnae and vice president of technology for IDG Corp.

Dr. Vest will present diplomas to the bachelor of science degree recipients and those receiving both bachelor of science and master of science degrees, while Provost Brown will give out the doctoral, engineering

and other master's degrees. The two lines of students will approach the stage simultaneously as their names are announced in an alternating pattern.

Following the Commencement program, President and Mrs. Rebecca Vest will hold a reception for graduates and their guests at several locations in or near McDermott Court.

A second important event awaits some of the graduates, relatives and guests on Commencement day. At 6pm on June 4, a commissioning ceremony will be held for graduating cadets and midshipmen in MIT's Army, Air Force and Navy Reserve Officers Training Corps (ROTC) units under the masts of the historic frigate *USS Constitution* at the Charlestown Navy Yard Historical Park. The speaker will be Rear Admiral John B. Padgett III, commander of Submarine Group Two in Groton, CT.

The Commencement speakers last year were President William J. Clinton and Dr. David Ho, scientific director and chief executive officer of the Aaron Diamond AIDS Research Center in New York. United Nations Secretary General Kofi Annan spoke in 1997 and Vice President Albert Gore Jr. in 1996.

Tech Week to include Gala

(continued from page 1)

SM, SM, MET), president and CEO of Advanced Magnetics Inc.; and Seth Taylor (SM 1997), president and CEO of MolecularWare, the recent winner of the Sloan \$50K Robert P. Goldberg '65 Gold Prize.

Three MIT professors and a Yale professor who will soon join the MIT faculty will discuss their areas of expertise from 9am-noon on Saturday, June 5 in Kresge Auditorium. The professors and their topics are:

Dr. Robert S. Langer Jr. (ScD 1974), the Kenneth J. Germeshausen Professor of Chemical and Biomedical Engineering: "Biomaterials and How They Will Change Our Lives;" Professor David C. Page of biology and the Whitehead Institute for Biomedical Research: "The Human Genome Project, Sex and Infertility;" Dr. Martha Constantine-Paton, who joins the Department of Biology in July: "What Is Developmental Plasticity and What Does It Do for Us?" and Dr.

Robert A. Weinberg (SB 1964, PhD), a founding member of the Whitehead Institute and the David K. Ludwig Professor for Cancer Research: "How Cancer Begins."

President Charles M. Vest will moderate a question-and-answer session following the talks.

Panel discussions from 3-5pm in the Student Center and Kresge Little Theater will follow the annual Technology Day luncheon. The topics are "Aging, Alzheimer's and Arthritis;" "Trends for Health Care in the 21st Century;" and "Genetic Testing and Privacy: Ethical Dilemmas." Among the participants will be Dr. Mitchell Spellman, life member emeritus of the MIT Corporation; Professor Suzanne Corkin of brain and cognitive sciences; Professor Leonard Guarente of biology; Professor Page and Phillip R. Reilly, director of the Shriver Institute for Mental Retardation.

Robert J. Sales