Although first developed for young children, **I/O Brush** made a big splash with adults when it debuted at the Ars Electronica Center in Linz, Austria last year. “During the first week we observed several hundred people interacting with it, which led to several design changes,” says Ryokai. “First, because adults were more particular about their inks, we developed a physical palette where, just like painting with oils or watercolors, the artist is able to preview selected “inks” and reuse them in different combinations.

“Then, it became clear that both artists and audiences were very interested in the origins of the colors, textures, and movements used,” adds Ryokai. “In response, we developed a feature where each brush stroke can be linked to pop-up movies that take the artist and audience back through the journey behind the palette of colors. In addition, after working with the **I/O Brush** for several weeks, the kindergarten children began to associate the elements of their paintings with their environment. For example, blue wasn’t just a color, but rather the blue of their favorite jeans or their friends’ eyes.”

When first introduced to **I/O Brush**, the children called it magic. It’s not difficult to imagine why.

To learn more, visit [http://tangible.media.mit.edu/projects/iobrush](http://tangible.media.mit.edu/projects/iobrush)
To address this dilemma, recent PhD recipient Stefan Marti, working with Chris Schmandt in the Lab's Speech Interface group, has developed the Cellular Squirrel—an autonomous interactive intermediary to manage telephone interactions. "Humans are experts in social interactions; devices are not," says Marti. "But the squirrel can send out readable social cues, such as gaze and gesture, to alert in a subtle and non-annoying way—to give human-like social intelligence to our telephone agents."

"We now have agents to filter out our overwhelming number of communications," adds Schmandt. "But the problem is that we operate in physical reality, and these agents operate in cyberspace. How do I know that my agent is working? And how do I have a satisfying interaction? We thought the answer might be to give the agent a physical presence—to create a personal companion—a cute stuffed animal that can signal an incoming call by a simple movement."

The squirrel (which has been a parrot and a rabbit in earlier prototypes) is a small, wireless, Bluetooth-enabled, robotic animal that actively mediates between a telephone caller, the recipient of the call, and anyone in the room with the recipient. Sporting a fully digital link for audio and data, it is equipped with a custom-made skeleton, actuators, and data and audio transceivers. While future models may be controlled directly by a cell phone—or may in fact be a cell phone—this prototype is operated by a computer-controlled, remote "brain."

Sensing devices enable the squirrel to detect and analyze conversation. Then, aided by caller ID, it can evaluate the importance of an incoming call to determine whether it is appropriate to interrupt. Alternatively, it can suggest leaving a voice instant message, or can just let the call go to voice mail.

"This is a real improvement over placing my phone on vibrate," says Schmandt, "because it gives both you and the other people in the room a chance to interact socially—to negotiate—with the communication device."

In the end, it's all about improved social interaction and politeness. Miss Manners would be pleased.

To learn more, visit http://www.cellularsquirrel.com
BENTON HONORED POSTHUMOUSLY WITH LAND MEDAL

Holography pioneer Steve Benton, a founding member of the Media Lab and head of the Lab’s Spatial Imaging group until his death at age 61 in November 2003, was posthumously awarded the 2005 Edwin H. Land Medal. The award recognizes an individual who has, from a base of scientific knowledge, demonstrated pioneering entrepreneurial creativity that has had major public impact.

Benton, known worldwide for inventing the white-light transmission “rainbow” hologram, held the E. Rudge and Nancy Allen Professorship of Media Arts and Sciences, and was also director of the MIT Center for Advanced Visual Studies (CAVS). An enthusiast for all things optical, he began his career as a scientist at the Polaroid Research Laboratories, where he reported directly to Edwin Land—one of two mentors who influenced Benton’s life (the second being MIT Professor Harold “Doc” Edgerton).

A joint award of the Optical Society of America and the Society for Imaging Science and Technology, the medal was made possible through an endowment established by the Polaroid Foundation. It was presented to Benton’s widow, Jeannie, in Washington, D.C. on April 27.

NEW BOOK

FAB: The Coming Revolution on Your Desktop—From Personal Computers to Personal Fabrication

Neil Gershenfeld
Basic Books
2005

In FAB: The Coming Revolution on Your Desktop, Neil Gershenfeld, director of the Center for Bits and Atoms (CBA), explores research in digital fabrication and its application in personal fabrication. His research enables ordinary people to design and produce their own products, in their own homes, with machines that combine consumer electronics with industrial tools. He projects how personal fabricators that can print functional things instead of just images will revolutionize the world, just as personal computers did a generation ago, but with even greater impact. This time around, however, we will be personalizing “our physical world of atoms rather than the computer’s digital world of bits.”

Gershenfeld describes how personal fabrication is possible even today, with examples drawn from CBA’s field “fab labs,” ranging from inner-city children in Boston making jewelry from scrap material to sell, to villagers in rural India developing devices for monitoring food safety. According to Gershenfeld, the biggest thing coming in computing will lie, quite literally, out of the box—in making the box.

Sponsors may request more information about topics in FRAMES from Ellen Hoffman at hoffman@media.mit.edu by telephone at 617 253-0640.

For information about the Media Lab, visit http://www.media.mit.edu.

Media Lab sponsors may visit FRAMES online through insite, http://www.media.mit.edu/insite.

Honors

Hiroshi Ishii, co-director of the Things That Think consortium and head of the Tangible Media group, was one of two MIT faculty members to receive the Class of 1960 Innovation Award. The award, presented for a two-year term, was established to encourage and promote innovative instruction. It provides a scholar allowance of $60,000 to support the recipient’s teaching activities.

Marc Schwartz, a master’s candidate in the Lab’s Physical Language Workshop, won a Fulbright Fellowship to study at the Keio University Center in Japan next year. As a student of Japanese at MIT, Schwartz became frustrated with stand-alone CD-ROM learning software, and will use his fellowship year in Japan to develop Internet-based, peer-to-peer software, which will allow learners of English in Japan to connect with learners of Japanese in the United States, helping both English and Japanese speakers to communicate and teach each other a foreign language.

Kimiko Ryokai and Stefan Marti were selected as a Gold IDEA winner for the I/O Brush (featured in this issue) in the 2005 Industrial Design Excellence Awards competition. This year the jury awarded a total of 148 awards (38 golds) from a record 1380 entries. The award, presented by the Industrial Designers Society of America (IDSa), will appear in the July 4 issue of BusinessWeek magazine.

Mary Farbood was awarded top honors for her harpsichord performance at the 57th Prague Spring International Music Competition by outperforming 37 young artists from Korea, Japan, China, the United States, and every country in Europe. In addition to winning the competition’s first prize, Farbood also took home the Bohuslav Martinu Foundation Prize for the best performance of Martinu’s Concerto for Harpsichord and Small Orchestra. The prize was presented on May 15.

MACHOVER AT THE POPS

Tod Machover took center stage at Tech Night at the Pops on Thursday, June 2, when the Boston Pops premiered his new concerto, Jeux Deux for HyperPiano and Orchestra.

Commissioned by conductor Keith Lockhart and the Boston Pops, Jeux Deux represents a playful back-and-forth dialogue between piano and orchestra, and between soloist and “hyperized” piano. It is, according to the Boston Globe, “a stirring piece that proved that the HyperPiano . . . could make emotionally evocative music.” The composition also represents a new phase in Machover’s Hyperinstrument work, since both piano and orchestra are purely acoustic, with no amplification or electronic enhancement.

To add an additional Media Lab touch, the piece was accompanied by large, projected, interactive images by Media Lab doctoral student Marc Downie—images that followed the soloist’s notes and gestures. Pianist Michael Chertock performed.

To learn more, visit http://web.mit.edu/newsoffice/2005/arts-technight-0601.html

Photo: Miro Vintoniv / Courtesy of the Boston Symphony Orchestra.
headed by David Cavallo and Seymour Papert, are redefining the meaning of “education.” Whether it’s a few miles down the road, or halfway around the globe, “A major focus of our work is learning. While most educators agree that learning needs to change dramatically, that we need to challenge the single classroom of the country where everyone learns the new art of reading and writing. A cautious plan is adopted: within four years everyone learns to use as freely and creatively as possible the tools of the engineer. Everyone learns to think—to help facilitate the understanding of technology, “says Cavallo. “And it’s a great way to integrate innovative learning into the community.”

The project was designed by David Cavallo and Mel King, adjunct professors working at the MIT Media Lab, and involves the participation of the Massachusetts Institute of Technology, the Boston Foundation, the City of Boston, and the Boston Community Foundation, the City’s Action for Boston Community Development. It is funded through Lab sponsor Schlumberger, provides a channel for company support in the classroom. Schlumberger Excellence in Educational Development (SEED) funds projects that provide innovative, tech-savvy, and educational support to inner-city neighborhoods. For example, the SEED program—an effort to reach those at the periphery of the city—to reach those who would otherwise not be involved with learning or school initiatives. These projects often involve members of the community who would otherwise not be involved with learning or school initiatives. These projects often involve members of the community who would otherwise not be involved with learning or school initiatives. These projects often involve members of the community who would otherwise not be involved with learning or school initiatives. These projects often involve members of the community who would otherwise not be involved with learning or school initiatives. These projects often involve members of the community who would otherwise not be involved with learning or school initiatives. These projects often involve members of the community who would otherwise not be involved with learning or school initiatives. These projects often involve members of the community who would otherwise not be involved with learning or school initiatives. These projects often involve members of the community who would otherwise not be involved with learning or school initiatives.
Emphasizing that innovation doesn’t come about by just adding computers to traditional classroom settings, they are pioneering new concepts in project-based education, changing the way we think about what it means to “learn.”

“While most educators agree that learning needs to change drastically—that we need creative societies where people learn how to learn—few are willing to challenge the basic underlying conceptual and organizational precepts that form our educational systems,” says Cavallo. “A major focus of our work is to help create innovative learning environments in areas where people have been marginalized and have not had fair access.”

Whether it’s a few miles down the road, or halfway around the globe, members of the Media Lab’s Future of Learning group, headed by David Cavallo and Seymour Papert, are redefining the meaning of “education.”
These three projects are designed to demonstrate how the methodology, materials, and content for learning can be different. Future of Learning group members use these projects as objects with which to think—to help facilitate non-incremental change in learning environments.

**L2T:T2L**
**Learn to Teach : Teach to Learn**

Since this past April, some 30 teens from Boston’s inner-city neighborhoods have been coming to the Media Lab to work on projects in areas such as energy, robotics, computer programming, Web design, and fabrication. During the first two weeks of August, these “learners” will become teachers—bringing their projects out into the community by working with middle-school students through community centers. “For us, this is a testbed to find non-traditional ways for kids to experience how it feels to become creators rather than just users of technology,” says Cavallo. “And it’s a great way to integrate innovative learning into the community beyond the schools.”

This project was designed by David Cavallo and Mel King, adjunct professor emeritus in MIT’s Department of Urban Studies and Planning. It is a collaboration with Boston’s South End Technology Center, and receives funding from the Barr Foundation, Action for Boston Community Development, the Boston Foundation, and the City of Boston.

**The City that We Want / A Cidade que a Gente Quer**

Several years ago, the Future of Learning group began working closely with more than 80 schools throughout Brazil with support from Agência Estado, the Bradesco Foundation, and the cities of São Paulo and Curitiba. This work has introduced tens of thousands of pupils and their teachers to the Lab’s “constructionist” approach to education; rather than set an explicit curriculum, teachers and students are offered sample ideas for projects that help them integrate technology with existing materials and that focus on community needs. These projects often involve members of the community who would otherwise not be involved with any learning or school initiatives.

Over the past year, this initiative has been extended to 150 schools, and is slated to soon include all 500 schools of the São Paulo municipal system. Moreover, as part of the mayor’s new initiative to provide more learning opportunities for everyone in São Paulo—and to extend the school day for children through enrichment activities—the program will be brought to new centers—initially those at the periphery of the city—to reach those who previously have had very limited opportunities.

**Collaboration with Schlumberger Excellence in Educational Development (SEED)**

The SEED program, funded through Lab sponsor Schlumberger, provides a channel for company members to share their passion for science, technology, and learning with youths in developing communities. Working closely with SEED volunteers, members of the Future of Learning group are creating and sponsoring hands-on, intensive workshops in Mexico, Malaysia, Russia, and India. The concentration is on having children and teachers address problems that affect their own, as well as global, communities. A current focus is on water resources. Additional projects are planned for Nigeria and Venezuela.
One Laptop Per Child
thoughts from Seymour Papert

A Parable
Writing has just been invented in a country that has developed a sophisticated culture of poetry, philosophy, and science using only oral language. Someone gets an idea: writing might be good for learning. Many suggestions are made. The most radical is to provide all teachers and children with pencils, paper, and books, and suspend regular classes for six months while everyone learns the new art of reading and writing. A cautious plan is adopted: within four years a pencil will be placed in every single classroom of the country so that every child, rich or poor, will “have access to the new technology.” Meanwhile, educational psychologists stand by to measure the impact of pencils on learning.

This parable helps to bring home the importance of the Media Lab's One Laptop Per Child (OLPC) program—an effort to provide children throughout the world with their own machines to use as freely and creatively as pencil and paper.

The Media Lab is working toward this goal by:

- initiating the Hundred Dollar Laptop (HDL) project, which seeks to develop a computer that can be distributed to schoolchildren for less than $100 per machine. Why has the computer industry devoted billions of dollars to making computers more powerful than most people need, yet has not developed a truly inexpensive machine?
- recognizing the deep intellectual nature of developing new approaches to the content of learning. This is not yet being taken seriously by anyone. We are just beginning.
- moving beyond thinking that the solution is putting machines in schools and giving educators an idea curriculum. Everyone needs to radically change the way we think about learning.

Visit the Future of Learning group’s Web site at http://learning.media.mit.edu

Photos: Arnan Sipitakiat