

Edgerton Center

The mission of the Edgerton Center is to uphold the legacy of Harold “Doc” Edgerton by

- being a resource center for MIT students engaged in hands-on projects, inter-collegiate technical competitions, and service learning.
- maintaining MIT’s expertise in high-speed and scientific photography.
- building ties to the broader community through our K–12 outreach program.

Over the past year our programs have continued to flourish, our service learning collaboration with the Public Service Center has hit its stride, and our d’Arbeloff program (with the Department of Athletics, Physical Education, and Recreation [DAPER]) has begun. We begin with an update on the status of the Service Learning Program and the related IDEAS competition. We then review our ongoing core programs, and close with a summary of our d’Arbeloff effort with DAPER.

Service Learning

Service learning is a teaching method in which students work on curriculum-focused projects that serve the community. Its premise is that students learn more from a project when they know that their work will make a difference in the lives of others. Through service learning, students will better understand the ethical implications of their future professions, and communities in need will be provided with valuable, unique help. Our goal is to couple service learning with the Edgerton Center’s focus on hands-on education to create a range of subjects across the Institute that challenge our students to learn science or engineering while providing meaningful help to the larger community.

Curricular Initiative for Development Design

D-Lab (<http://web.mit.edu/d-lab>) is the newest thrust of our service learning initiative. It is a sequence of subjects that educates MIT students about the technical challenges faced by communities in the developing world and provides our students with an opportunity to use their engineering skills to make a positive contribution to these communities. D-Lab has four components:

- A subject during the fall term in which students learn about international development and appropriate technology through case studies and guest speakers. The class also provides a cultural, social, political, environmental, and economic overview of the countries in which we have projects, as well as an introduction to the local language.
- A field trip during MIT’s January Independent Activities Period (IAP) to identify technical problems that are faced by communities in the target country
- A spring-term design seminar in which students develop solutions to the problems identified during the IAP field trip
- An extended trip back to the country over the summer to implement and test the solutions developed in the design classes

In January, 29 students traveled to India, Brazil, and Honduras to experience these locales first hand and identify potential projects. This summer four of those students are back in the field to implement the solutions they developed.

There is growing interest among engineering educators in integrating such development design projects into engineering curricula, and MIT is taking a leading role, through the tireless efforts of Amy Smith, of our staff. She has organized a series of annual workshops that bring together 10 to 15 people from top universities (including MIT, Cal Tech, Stanford, Harvard Medical, and U. Michigan) who are pursuing various programs in this field. The goal of the workshop is to ensure cooperation between these programs and to allow those practicing in this nascent field the opportunity to share their hard-learned lessons.

Ms. Smith's work was the feature of an article in the *New York Times Sunday Magazine* last November 30, which led to her spending a day in New York meeting with the Secretary General of the United Nations and members of his staff on ways to advance MIT's efforts. The project was praised by the visiting committees for both the Dean for Undergraduate Education and Dean for Student Life offices, as a result of the connection to the Public Service Center. The program was also featured at an Alumni Campus Visit, hosted by Phil Clay last April. With the help of the Development Office, we are now engaged in a significant fundraising project to bring in the funding necessary to sustain the Curricular Initiative for Development Design program.

IDEAS Competition

The MIT IDEAS Competition (a joint project with the Public Service Center) encourages MIT students to work in teams to develop their creative ideas into products and processes that serve individuals and communities, locally, nationally, and internationally. The IDEAS Competition combines features of existing invention and business-plan competitions with an emphasis on community service and community involvement. The students receive mentoring from faculty, staff, and industry professionals as they work through a needs analysis, the product development process, and team building. Along the way we provide teams with constructive criticism and materials grants, and host a poster session at the final awards ceremony.

In this third year of the competition, 28 teams submitted final proposals, and \$20,000 of prize money was awarded to six teams. The winning projects included a chlorination dosage system to improve water quality in developing nations, a system to issue flood warnings, a device to assist the vision-impaired, and a program to reuse old computers to improve cross-cultural communications between ethnic communities and social services and businesses.

Ongoing Programs

Academics

Strobe Project Lab (6.163) continues to be heavily over-subscribed, and our other regular offerings in electronics, robotics, and digital imaging are also popular. Our staff oversaw two advanced undergraduate projects for Electrical Engineering and Computer Science students. In total, more than 150 MIT students enrolled in the 20 subjects the Edgerton Center offered for credit in the 2003–2004 academic year.

Technical Imaging

The center is still the Institute's go-to place for high-speed imaging. Our high-speed video systems were used by seven research groups and several Institute subjects over the past year. In 2004 our week-long summer short course on high-speed imaging was oversubscribed with 34 attendees from government, academia, and industry. Our darkrooms—both digital and film—are well used by students from four of our subjects and by students in the Undergraduate Research Opportunities Program and other hands-on projects.

Outreach

Our outreach program continues to be a window into MIT for local schoolchildren, with 997 Cambridge Public School students (58 groups from fourth- through eighth-grade classrooms) visiting the center during the 2003–2004 school year to conduct hands-on science activities. We also provide these activities to other community groups (other schools, scout groups, home-school groups, etc.). For the previous academic year, activities offered to non-Cambridge groups brought in another 1,229 students, for a total of 2,226 students (K–12) performing hands-on science activities at MIT. Since its inception over seven years ago, the Edgerton Center Outreach program has provided a window into MIT for more than 11,600 visits by groups of children and teachers from the greater Boston area. The outreach program is partially supported by the Center for Environmental Health Sciences. In turn we provide a significant portion of the outreach programming that their grant requires.

In a separate effort we have been working on a solar energy project with a physics teacher and his students at the John D. O'Bryant High School in Boston. This work is supported by outreach funds that are coupled with a NASA project under the supervision of Professor Dave Miller in the Department of Aeronautics and Astronautics. We participated in a recent opening ceremony attended by the mayor and the superintendent of the Boston Public Schools.

The center continues to host the engineering design component of the Minority Introduction to Engineering, Entrepreneurship, and Science Program and hosts the Saturday Engineering Enrichment and Discovery Academy program for high school students, known as SEED.

Student Shop and Hands-on Resources for MIT students

MIT's student shop is operated by the Edgerton Center, and its manager, Fred Cote, is a member of the center's staff. The shop is located across from the Electrical Engineering and Computer Sciences buildings on Vassar Street. The shop continues to provide an important resource to MIT graduate and undergraduate students. Students can receive training at the shop and, once trained, are able to use the shop resources for independent projects.

By hiring part-time help, the shop is now open beyond Monday through Friday 9 am–5 pm; hours have been extended on four evenings of the week, and on Saturday afternoon (totaling 52 hours of operation per week). Our two computer-controlled milling machines allow students to make much more difficult parts for projects. Approximately 7,000 student hours are logged in the shop each year. These students typically represent 16 departments and programs from the schools of Engineering, Science, Architecture and Planning, and Health Sciences and Technologies.

Support for Student Clubs and Teams

The Stratford Foundation has offered generous financial support to greatly expand the center's ability to support student-initiated hands-on projects. Supported projects include the following:

- MIT Solar-Electric Vehicle Team
- Remotely Operated Underwater Vehicles Team
- MIT Rocket Team
- Project ORCA (underwater robotics)
- Formula SAE (formula-style auto racing)
- Mars Gravity Project
- Engineers Without Frontiers
- Easy Rider (MIT motorcycle club)
- MIT Battlebots Team
- FIRST (supporting high-school robotics)

We provide centralized institutional recognition and support for these teams, some financial support (they are expected to raise a significant portion of their support from other sources), access to a pool of common tools and resources, and (most difficult of all) space to carry out their work. We provide a permanent space for the clubs in the basement of Building E60 (the old Arthur D. Little building), which the Institute has generously renovated.

High-Speed Imaging for Physical Education—A d'Arbeloff Project

We have, in collaboration with DAPER, a new d'Arbeloff project: High-Speed Imaging in Physical Education. The new tools and methods that we are creating will enable new active learning opportunities for Physical Education (PE) instructors, students, coaches, and athletes, as well as introducing new hands-on undergraduate research

opportunities. These tools will provide real-time feedback to students as they learn and perform physical skills and techniques; a library of instructional imagery for in-class demonstration of physical skills and techniques; imagery for use by academic subjects (e.g., 8.01T) to demonstrate fundamental concepts in science and engineering; an imagery database for the development of courseware for PE subjects; and an engaging array of project-based learning and research opportunities for students.

The main objective of this work is to engage MIT undergraduates with a PE learning opportunity that is both exciting and more closely integrated into the academic mainstream. An additional objective of our proposal is to forge links between DAPER and the degree-granting departments, in particular by creating high-quality, high-speed video clips of various athletic events that can be used in subjects to illustrate fundamental concepts in science and engineering. Working in concert with the Physics Department, high-speed imagery generated by PE classes offers 8.01T students a rich and innovative approach to the exploration of mechanical principles.

Staff Changes

We are pleased to announce that Mr. Stephen Banzaert has joined our staff as a part-time instructor. An MIT alum, Steve's duties include administering and assisting in teaching the Public Service Design Seminars and assisting in the supervision of the clubs and teams.

J. Kim Vandiver
Director
Professor of Ocean Engineering
Dean for Undergraduate Research

More information about the Edgerton Center can be found on the web at <http://web.mit.edu/edgerton/main.html>.