

Lemelson–MIT Program

In FY2009, the Lemelson–MIT Program (LMIT) successfully went through the third cycle of the relaunched awards program and the second integration of the EurekaFest celebration with the InvenTeams Odyssey—all in pursuit of its mission to recognize outstanding inventors, encourage sustainable solutions to real-world problems, and enable and inspire young people to pursue creative lives and careers through invention.

Strategic collaborations and creative experimentation were again the hallmark of LMIT operations in FY2009. Working with various partners, LMIT shared and implemented novel ideas to drive invention and innovation through three main programmatic thrusts—awards, invention education, and thought leadership—supported through an annual celebration event, EurekaFest.

Annual Invention Awards

2009 Lemelson–MIT Prize

Presented to an outstanding living American inventor-innovator who has significantly benefited society, the \$500,000 Lemelson–MIT Prize is the program's most prestigious vehicle for creating excitement about invention and innovation. This is the third year we are awarding to a midcareer individual. Our intent is that the award will be more likely to act as a catalyst for a recipient's inventive work(s) and he/she will be a more accessible role model for youth. Feedback suggests that this year's winner, as in the past two years, was highly inspiring for youth attending EurekaFest.

The Lemelson–MIT Prize Committee awarded Dr. Chad Mirkin, the George B. Rathmann professor of chemistry and director of the International Institute for Nanotechnology at Northwestern University, the 2009 \$500,000 Lemelson–MIT Prize. As a leader in the burgeoning field of nanotechnology and a world-renowned chemist, Mirkin is the author of 380 manuscripts and more than 350 patents and applications and is listed as the third most cited chemist and the top most cited nanomedicine researcher in the world. Daniel Lipinski, US House of Representatives, Illinois, states, "Professor Mirkin's cutting-edge, innovative work is greatly contributing to America's economic competitiveness and will help ensure that the nation remains at the forefront of one of the most promising areas in science."

Mirkin is best known for the invention, development, and commercialization of two revolutionary technologies—the nanoparticle-based medical diagnostic assays underlying the Food and Drug Administration–approved Verigene ID system and Dip Pen Nanolithography, an ultrahigh-resolution molecule-based printing technique. Both inventions were born, in part, out of Northwestern University's Nanoscale Science and Engineering Center, funded by the National Science Foundation, and were conceived, managed, and directed by Mirkin. There, Mirkin's research, with the help of Northwestern University graduate students and colleagues, has formed the basis of several start-up companies that are helping to bring his inventions from the lab to the market.

Mirkin also serves as a role model and leader for aspiring young scientists and inventors. Through work with the International Institute for Nanotechnology, Mirkin and his colleagues devise innovative science programs around the country to educate youth, including development of the [DiscoverNANO](#) website, which introduces young people to the wonders of nanotechnology. Mirkin is also working with the Museum of Science and Industry in Chicago to complete a hands-on nanotechnology exhibit.

Exclusive story rights were given to the *Wall Street Journal*, which broke the story of Mirkin’s award early on the morning of June 24, 2009.

For more information visit <http://web.mit.edu/invent/n-pressreleases/n-press-09LMP.html>.

2009 Lemelson–MIT Award for Sustainability

Created to address the growing importance of sustainability—for the developing world and industrialized nations—the \$100,000 Lemelson–MIT Award for Sustainability recognizes and supports inventors who are working to safeguard the well-being of our communities and planet.

The third annual \$100,000 Lemelson–MIT Award for Sustainability was presented to Dr. Joel Selanikio in recognition of his accomplishments in public health and international development. Selanikio is cofounder of DataDyne and assistant professor of pediatrics at Georgetown University Hospital in Washington, DC.

“Joel’s inventiveness and ability to leverage his unique, multi-discipline background is impressive,” states World Bank operations analyst Onur Ozlu, who nominated Selanikio for the award. “He is a thought leader in the area of mobile health for developing countries and is dedicated to improving global public health by creating sustainable technologies that are scalable, affordable and practical.”

Selanikio became devoted to improving data collection in public health while working as a US Public Health Service officer at the Centers for Disease Control and Prevention. He found that existing means of data collection for disease surveillance and immunization programs were inefficient—health workers carried hundreds of thousands of sheets of paper to the field, a process that was inconvenient, expensive, and environmentally unsound. Moreover, after paper forms were filled out, the data had to be manually entered into a computer system for analysis, which could take more than a year; this paper-based system severely hampered the ability of health organizations to evaluate the success of their programs and move quickly in battling disease outbreaks.

With the proliferation of mobile phones and personal digital assistants, Selanikio recognized the potential of handheld computers in dramatically improving the data collection process. “I set out to develop software that was extremely simple to use; taking the skills, expertise and capacity that previously came with hiring a consultant and instead, put the necessary tools into the hands of the actual public health officer, nurse or physician,” states Selanikio. “I was determined to make the software both free and open source, as not to raise barriers to data collection.”

For more information visit <http://web.mit.edu/invent/a-winners/a-selanikio.html>.

2009 Lemelson–MIT Student Prize

Awarded annually since LMIT's inception to a MIT senior or graduate student who created or improved a product or process, applied a technology in a new way, redesigned a system, or demonstrated remarkable inventiveness in other ways, the \$30,000 Lemelson–MIT Student Prize continues to serve as a highlight of our activities both on campus and beyond. At a press conference on March 3, 2009, Dorothy Lemelson announced Geoffrey von Maltzahn, a PhD candidate in the Harvard–MIT Division of Health Sciences and Technology (HST), as the prizewinner for his promising innovations in the area of cancer therapy, specifically two inventions in nanomedicine: a new class of cancer therapeutics and a new paradigm for enhancing drug delivery to tumors. It is worth noting that von Maltzahn is the third HST student to win the student prize in the past six years; other recipients are David Berry (2004) and Timothy Lu (2008).

Working at the confluence of nanotechnology, engineering, and medicine, von Maltzahn's innovations have the potential to reduce side effects and overpower drug-resistance mechanisms by "more powerfully concentrating external energy and targeted therapeutics in tumors," states von Maltzahn. Since 2004, von Maltzahn has worked closely with his advisor, Dr. Sangeeta N. Bhatia, an electrical engineering and computer science professor in HST, to invent novel treatments that precisely target and destroy tumor cells without affecting healthy tissue. Seeking to improve the specificity of cancer ablation—the destruction of tumors through the application of heat—von Maltzahn developed polymer-coated gold "nano-antennas" that can target tumors and convert benign infrared light into heat. "The polymer-coated gold nano-antennas are the longest-circulating and most efficiently heated to date," states Dr. Bhatia. "Pre-clinical trials reveal that a single intravenous nanoparticle injection eradicated 100 percent of tumors in mice using a near-infrared light. The results of these trials are very promising, meaning that the impact of this technology is wide-reaching with many potential applications." Von Maltzahn's work has already had a significant impact scientifically and commercially, resulting in eight patent applications, 19 submitted or published papers, and his founding roles in two companies: Nanopartz Inc. and Resonance Therapeutics. Nanopartz was founded more than one year ago to address the nanotechnology industry's need for dependable and standardized nanoparticle sources. Von Maltzahn's goal with Nanopartz is to aid in research endeavors worldwide by supplying a repertoire of gold nanoparticles for a broad spectrum of commercial applications, ranging from biomedicine to energy. Resonance Therapeutics was founded to bring nano-rods toward clinical applications and to develop technologies that amplify the efficacy of existing cancer therapeutics.

True to form among our student prize winners and inventive university students in general—and at MIT in particular—von Maltzahn has diverse inventive and entrepreneurial interests. During von Maltzahn's time at MIT he has also developed inventions outside the polymer nano-rods and systems nanotechnology paradigm for improving drug delivery, including a low-cost method for hemorrhage detection, a new class of self-assembling lipid-like peptides with promising applications in gene therapy, sensors for detecting tumor protease hot spots in magnetic resonance imaging, a method for remotely controlling drug release from nanoparticles, and a variety of new nanostructures for improved drug delivery and imaging.

More information about von Maltzahn can be found at <http://web.mit.edu/invent/n-pressreleases/n-press-09SP.html>.

This year we continued with aspects of the Lemelson–MIT Student Prize introduced last year and added a few more—all well-received.

Continuing from 2008: Increased visibility by holding the press conference in an accessible site; this year we held it in the MIT Media Lab’s Bartos Theater, utilizing the lobby for a poster session before and a reception after the announcement. Additional traffic and the location improved visibility and interest and provided broader recognition of inventive students at MIT through recognizing finalists; Erez Lieberman and Aviva Presser were selected as finalists and during the announcement displayed posters of their work, were recognized, and received \$1,000 awards. The additional students, their parents, and mentors made for a more rewarding event.

New in 2009: A community-building event the night before the announcement for all student prize applicants, held in partnership with Flagship Ventures and hosted by 2004 Lemelson–MIT Student Prize winner David Berry.

Again this year, the Lemelson–MIT Student Prize received extensive local and national press, with more than 65 million media impressions to date. Of note were placements in the *Boston Globe*, *Boston Herald*, *Boston Metro*, *Mass High Tech*, *Scientific American*, *USA Today*’s photo highlights, and Xconomy.com. Broadcast stations covering the announcement included WBZ-AM, FOX-TV, and NECN. MIT news highlights included the *MIT Spectrum*, *Technology Review*, and HST newsletter *The Connector*.

2009 Lemelson–MIT Collegiate Student Prizes

2009 marked the third year of our collegiate student prize collaboration with Rensselaer Polytechnic Institute (RPI) and the University of Illinois at Urbana–Champaign (UIUC) and the inaugural year with the California Institute of Technology (Caltech). Recipients of this year’s \$30,000 Lemelson–Rensselaer Student Prize, the \$30,000 Lemelson–Illinois Student Prize, and the \$30,000 Lemelson–Caltech Student Prize, respectively, were John Wright, who developed new mathematical tools that drastically improve the accuracy of facial recognition systems such as those used at Boston’s Logan airport, at the 2001 Super Bowl, and by the Tampa, Florida, police department; Yuehua (Tony) Yu, who has built binary G-gels that could enable a new generation of targeted drug-delivery technologies and implantable medical devices; and Ophir Vermesh, who invented the Integrated Blood-Barcode Chip, which has the potential to change how clinical-based blood protein biomarkers are measured. Similar to MIT, RPI, UIUC, and Caltech also recognized finalists.

Per our commitment to the Lemelson Foundation, we plan to strengthen and expand this successful program to a fifth, to-be-determined, school.

Invention Education

Lemelson-MIT InvenTeams

InvenTeams, LMIT's grants initiative supporting high school invention teams, continued as a national program in FY2009. In October 2008, 16 new grants were awarded through LMIT's national InvenTeams initiative. The grantees were from 14 states. Several schools were "low-income," defined as schools with greater than 40% of the student population on a Free and Reduced-Price Lunch Program (FRPL) and/or in a county that meets the US Department of Housing and Urban Development definition of a county in which at least 80% of the population is below the state's median family income. This year, three teams came from low-income schools, including one school with a FRPL rate in excess of 80%.

InvenTeam prototypes yielded one consumer product, six assistive devices, two environmental/energy inventions, one safety device, two transportation-related inventions, one agricultural product, and three affordable technology devices for developing countries. The strong showing of interest in inventions in the assistive and affordable technology areas is in-line with this year's Invention Index (see "Thought Leadership," below) that found teens' interest in a career in science, technology, engineering, and math (STEM) is motivated by a desire to help improve and protect the environment or improve society.

More than 500 students, teachers, and mentors were involved in these 16 new and 14 ongoing projects from rural (20%), urban (13%), and suburban (67%) school settings. An impressive 4:1 student-to-teacher/mentor ratio made for high-quality experiences and helped address another finding in this year's Invention Index—namely, the need for mentors. This year, 24 of the 30 (80%) were public high schools. We noted a creditable 28% female participation on the teams. Young women led three of the teams; female teachers coached three teams. MIT alumni participated as mentors with one team. In addition, local companies provided mentors or funding to the 14 ongoing teams as part of our practice to encourage schools with follow-on grants. Testimonials from students, teachers, and mentors reflected a positive spirit to continue their inventiveness in addition to showing much gratitude to have been afforded the opportunity to participate in an enriching project under the umbrella of MIT.

Georgia Pacific sponsored one InvenTeam near its midwest facilities and will continue to recruit and sponsor at least one team, and as many as three, in 2010.

Partnerships with other companies and organizations—including SolidWorks, igus, Parallax, Vernier, and the National Engineering Design Challenge/JETS—continue to enrich the InvenTeams experience through their generous provision of materials, equipment, advice, and networks.

InvenTeams received much local and national press again this year, reaching more than 200 million media impressions and a NAPS video broadcast by 138 television stations across the country. Placements worth noting include coverage in the *Washington Post* and *Education Week* and on Discovery.com and NPR Science Friday.

In FY2010, LMIT will continue to ramp up its efforts to target companies and organizations suitable for supporting and mentoring InvenTeams. In addition, we will significantly increase our efforts toward developing invention education content for an online invention education tool/presentation and design challenges as well as collaborations with national organizations (e.g., 4-H, Boy Scouts of America, WGBH) to fund initiatives to reach more and younger youth. Moreover, we will work hard to position InvenTeams and LMIT overall to benefit from MIT's growing interest and sense of urgency to have an impact in K–12.

More information about InvenTeams can be found at <http://web.mit.edu/inventeams/>.

Lemelson–MIT Support for MIT Programs and Classes

LMIT appreciates the role it plays enhancing inventiveness among MIT students. Through the sponsorship of competitions and classes that provide opportunities for students to engage in solving real-world problems today and building skills (e.g., creative problem solving, networking, curiosity, empathy, and leadership) to become the global innovators of tomorrow. Moreover, our involvement allows us to develop (video) content directly from these students' experiences, which can inspire and inform youth to undertake similar or related projects.

MIT IDEAS Competition

LMIT helped sponsor the eighth annual MIT IDEAS competition, organized by MIT's Edgerton Center, Public Service Center, and International Development Initiative. The team-based competition provides awards for students to develop inventions and innovations that will make a positive change in the world. Winning teams must use prize money to refine their ideas or products and evaluate their performance in the field. While the competition invites creative solutions to community problems locally, nationally, and internationally, LMIT focuses its support to the MIT IDEAS competition on technological innovations for the developing world. This year, LMIT sponsored one award (\$7,500) and provided some operational support (\$2,500).

The \$7,500 LMIT-sponsored International Technology Award went to Heatsource, a team that created a way to take an inexpensive and simple technology and place it in a context where it can truly have an impact—low-cost, personal heating systems using paraffin, phase change, and local textiles.

More information about the IDEAS competition can be found at <http://web.mit.edu/ideas/www/index.htm>.

Product Engineering Processes

In 2.009 Product Engineering Processes, a senior-level mechanical engineering class, students work in teams of 14–16 individuals to design and build working alpha prototypes of new products. In this highly interactive and stimulating class, students develop skills in product design, creativity, innovation, group dynamics, team management, consensus building, and communication. Working within a budget, they engage in a unifying engineering experience.

This year, projects had a “home” theme. Guided by professor David Wallace, students designed useful products that can be used to improve the home environment and improve quality of life.

Products developed this year included an electromechanical Braille labeler; a spark detecting microwave; a basketball-returning machine; a cook top that heats anywhere on its surface; an automatic heating, ventilating, and air conditioning register system; a portable wall system for apartment living; and a folding, high-tech coffee table.

Final projects were presented on Monday, December 8, 2008, in what is a highly educational, thought-provoking, and entertaining evening event for the MIT community and class sponsors. The students, instructors, and professors of 2.009 continue to be a terrific source of recruiting information and inspiration for InvenTeams. Moreover, the student impact data collected parallel InvenTeams’s findings on changes in attitudes toward invention and product design.

LMIT funds (\$25,000) are used primarily for team project budgets, but they also provide resources for the students to participate in a number of engaging, creativity-enhancing, and hands-on learning experiences. In FY2010, funding for 2.009 will continue. More information about 2.009 Product Engineering Processes can be found at <http://web.mit.edu/2.009/www/>.

MIT \$100K Development Track

This year, LMIT initiated support (\$15,000) for MIT \$100K’s new concentration—the development track. Given the growing trend of student interest in international development at MIT—thanks in no small part to 2001 Lemelson–MIT Student Prize winner Amy Smith—the addition of a track encouraging sustainable business models for student ventures meant to empower the world’s poor coupled with the \$100K’s strong history, present a unique opportunity for the program to help MIT’s newest breed of innovators. The winner of this year’s MIT \$100K development track was Global Cycle Solutions, which also won “audience favorite” at the \$100K awards ceremony on May 13, 2009.

More information about the MIT \$100K development track can be found at <http://www.mit100k.org/the-100k-competition/track-descriptions/>.

Other opportunities LMIT may pursue for the 2009–2010 academic year include Independent Activities Period sessions and ongoing events for MIT students around the development of inventive “portfolios” and how students can make the most of their MIT experience to be inventive.

Thought Leadership

Lemelson–MIT Invention Index

In January 2009, LMIT released the results of a nationwide survey of teens on their attitudes toward STEM studies and careers as well as their perceptions of STEM

professionals. It followed a related survey in 2008, which asked teens and adults their thoughts about STEM preparedness, hands-on learning, and invention.

The results again supported LMIT's programmatic activities this year and received 76.6 million impressions, including coverage in top national outlets such as *BusinessWeek* and *Newsweek*.

More information about this year's Invention Index can be found at <http://web.mit.edu/invent/n-pressreleases/n-press-09index.html>.

Other examples of thought leadership include invitations to LMIT staff to speak at conferences and events on invention, innovation, and education and the facilitation of subsequent recognition of our award winners.

EurekaFest

June 24–27, 2009, LMIT held its second annual EurekaFest—a multiday celebration designed to empower a legacy of inventors through activities that inspire youth, honor role models, and encourage creativity and problem solving. Presented in collaboration with the Museum of Science, Boston, EurekaFest offered a series of activities in Boston and Cambridge to celebrate the inventive spirit.

Again this year, award winners were asked to invite the person who had most inspired them to the event, Lemelson collegiate student prize winners and finalists were presenters and mentors, InvenTeams students underwent a specially designed Advanced Invention-to-Venture training for high school students, and Excite Award Teachers (finalists for InvenTeams grants) participated in active learning workshops on tools, electronics, and the invention process and were able to learn about the InvenTeams experience from teachers and students. It was an ambitious program. In addition, there were other sympathetic educational programs running at MIT the week of EurekaFest, including the Minority Introduction to Engineering and Science (MITES) program and the MIT Science and Engineering Program for Teachers.

This year's EurekaFest featured collaborations again with fellow Lemelson Foundation grantees: the AI2V with the National Collegiate Inventors and Innovators Alliance and the Lemelson Center's hands-on invention activities during EurekaFest at the Museum of Science on Saturday, June 27.

LMIT aggressively marketed EurekaFest to the broader MIT community (e.g., postcards to all members) and the public (e.g., events calendars and Massachusetts Bay Transportation Authority bus kiosks around Kendall Square). Attendance at the EurekaFest LMIT Award Winner presentations, which included InvenTeams and Lemelson student prize winners from all four universities, was well above 325.

Dr. Joel Selanikio, the 2009 winner of the \$100,000 Lemelson Award for Sustainability drew a significant crowd and inspired the youth attendees during his evening presentation on Thursday, June 25, presided over by provost Rafael Reif.

For the second year, the Lemelson–MIT Awards ceremony was open to the public and attracted more than 300 guests in addition to the more than 200 InvenTeams students, teachers, educators, and mentors (screens throughout the Stata Center’s Student Street allowed passersby to watch as well). MIT president Susan Hockfield presided over the 15th annual awards ceremony, with dean of MIT Engineering Subra Suresh and Lemelson Foundation board chair Mrs. Dorothy Lemelson presenting. Several past Lemelson–MIT Student Prize winners in the greater Boston area attended the festivities or were active participants.

The group of Lemelson–MIT Collegiate Student Prize winners and finalists toured two local start-ups, both founded by former Lemelson–MIT Student Prize winners: Nathan Ball, 2007 Lemelson–MIT Student Prize winner, gave a tour of his company’s (Atlas Devices) operations, and 2006 and 2001 Lemelson–MIT Student Prize winners Carl Dietrich and Andrew Heafitz gave a tour of Terrafugia, their start-up company, which just this year successfully flight-tested “the transition,” their “roadable aircraft.” Scott Kirsner, frequent technology and innovation contributing writer to the *Boston Globe* and innovation evangelist, facilitated a lively breakfast discussion around role models and STEM among this year’s award winners and their “person of inspiration,” Lemelson–MIT Collegiate Student Prize winners and finalists, and several special guests, including Jeff Young (incoming superintendent of Cambridge Public Schools), Tessie Topol (director of strategic philanthropy and community affairs for Time Warner Cable), and representatives from the Lemelson Foundation and other Lemelson Foundation grantees.

EurekaFest at the Museum of Science featured the second year of Heavy Metal, a challenge to design and build a wind-powered device to lift a metal trashcan to the ceiling of the museum. More than 300 high school students from across the country (InvenTeams, MITES, and local youth) were placed on 30 mentored teams with strangers. LMIT collegiate student prize winners and finalists were mentors, along with instructors from MITES, InvenTeams alumni, and Museum of Science staff and volunteers. MIT-originating Harmonix—the company behind Rock Band—was actively engaged, providing several Rock Band set-ups for the day and a fiery and fun talk by their lead designer to get the students excited. The challenge finale was kicked off by Dr. Mirkin and Dr. Selanikio and their respective “persons of inspiration”—who served as judges for the challenge—entertaining the crowd playing Rock Band and culminated with the dropping of all 30 cans from the maximum height. Again this year, the challenge was prototyped earlier in the spring with local students and schools. More than 80 families from local battered women’s shelters were invited and attended the event, enjoying the invention activities for younger youth.

Participants and attendees at EurekaFest were enthusiastic and positive and volunteered for future years. Along with constructive feedback to improve the event, fellow Lemelson Foundation grantees and members of the MIT community were overheard saying that this was the “best event yet.”

Media reception was extremely positive in tone from a local and national level, resulting in more than 25.8 million impressions. Media highlights of note include coverage in

Boston.com, *Discovery.com*, *make.tv*, *TechCrunch.com*, *Technology Review*, *WBUR.org*, and *WBZTV.com*.

We look forward to developing, in collaboration with the Lemelson Foundation and grantees, the 2010 EurekaFest (June 2010). Significant among our adaptations for 2010 will be a strengthening of the programming and public components, possibly including a general call for, and showcasing of, inventors of sustainable technologies. LMIT aims to continue to expand the inventor network and forge connections to inspire others to invent and highlight inventiveness in the community. Ultimately, we will create an internationally recognized premiere event for inventors and the public, with emphasis on youth and inventiveness for sustainable development.

Personnel Changes

In January 2009, LMIT welcomed its third faculty director, professor Michael Cima; Professor Cima succeeded professor Merton Flemings, who had held the position since 2000. The program's reorganization, which began in FY2008, was completed in mid-FY2009. Several new staff members joined LMIT, including Ilana Schoenfeld (development and external relations officer), Ellen Dickenson (invention education associate), Ed Canton (awards program officer), Michael Perry (development and external relations assistant), and Michelle Barr (office administrative assistant). Ms. Amy Bishop, awards program assistant, left the program in mid-June; we are pleased that Maura Hume will join LMIT to fill this role in late August.

Joshua Schuler
Executive Director

More information about the Lemelson–MIT Program can be found at <http://mit.edu/invent/>.