Design Laboratory

Established in 2006 under the leadership of William J. Mitchell, the Design Laboratory is located within the School of Architecture and Planning. Its work focuses on the theories, techniques, and practices of innovative design as it pursues research, executes practical design and art projects, and engages in scholarship and criticism.

The Design Laboratory is organized as a collection of multidisciplinary research and project teams unconstrained by the traditional boundaries among design, planning, and engineering professions and disciplines. The Laboratory's projects engage new technologies to find fresh and highly effective solutions to problems of substantial social, economic, and cultural importance. They are concerned not only with the design of individual products, buildings, and urban areas but also with the roles that these elements play in larger urban, regional, and global systems and their long-term sustainability. The Laboratory is committed to the highest standards of design quality, and it pursues its projects within a context of vigorous debate about related issues of values, ethics, and social justice.

In 2007–2008, the Design Laboratory was host to eight projects, programs, and groups:

- ArchNet
- Program in Developmental Entrepreneurship
- Digital Design and Fabrication Group
- House_n
- Mobile Experience Lab
- SENSEable City Laboratory
- Smart Cities
- Smart Customization

ArchNet

ArchNet is an online international community of scholars, students, and professionals concerned with architecture, planning, and landscape design, with a special focus on the Islamic world. The ArchNet site is located at http://www.archnet.org. Its goal is to build bridges, particularly between the Islamic world and the West; share resources; encourage collaboration and communication; and nurture local expertise.

ArchNet has more than 57,000 registered members from more than 190 countries. The ArchNet editorial office has provided the Digital Library with an extensive range of resources, including 54,000 images of architecture in the Muslim world and more than 4,500 publications, reports, and technical documents. Traffic to the site has increased over the past year from 11,000 average sessions per day to 16,000, and total bytes transferred grew from 1.7 TB to 2.8 TB. The site has averaged about 95,000 page views per day. The group workspaces continue to be used extensively, especially

for educational purposes. During the past year, the project supported 2.5 research assistantships at MIT.

Program in Developmental Entrepreneurship

The MIT Program in Developmental Entrepreneurship focuses on design and implementation of commercially sustainable products and services for low-income communities around the world. In conjunction with the Sloan School of Management, the Media Lab, and the MIT Design Lab, the Developmental Entrepreneurship (DE) program offers instruction in development-oriented entrepreneurship, works with all of the other development-oriented programs at MIT, builds the Developmental Entrepreneurship Network in partnership with the MIT Alumni Association, and supports the new MIT $100,000 Competition in Entrepreneurship for Development.

A number of projects have been developed under the umbrella of the DE program. The Cell Bazaar provides localized eBay-type markets on cell phones in Bangladesh. Way Systems adds a card reader and banking network to convert existing cell phones into low-cost point-of-sale devices. United Villages delivers voice messaging and email to rural areas using ultra-low-cost WiFi technology, and Dimagi uses PDAs and cell phones to deliver health care services.

Digital Design and Fabrication Group

The Digital Design and Fabrication Group is a center for education and research in rapid prototyping and CAD/CAM operations for architects and designers. The group engages faculty and students in research focused on the relationship between design computing and the physical output of information using rapid prototyping and CAD/CAM machines for design representation and reflection.

The Digital Design and Fabrication Group offers a number of graduate and undergraduate courses that focus on the relationship between design and digital fabrication. Using state-of-the-art CAD/CAM machines including 3D printers, milling machines, and cutters, students, faculty, and researchers have undertaken a number of projects. Materializing Design investigates the theory of materializing a design beyond prototyping and computing. Design with Wood Substrates addresses ways to materialize designs with plywood products such as houses and furniture. Computable Composite Components is a novel evolutionary system used for the production of tiles and blocks. Finally, Historical Reconstructions studies ways to materialize historical structures designed by past architects yet still unbuilt.

House_n

House_n is a research group that focuses on how the design of the home and its related technologies, products, and services should evolve to better meet the opportunities and challenges of the future and the needs of people as they live in their homes. This broad research approach is leading to innovative product ideas not likely to be uncovered in more narrowly focused industries or research endeavors. Major House_n initiatives include the PlaceLab and the Open Source Building Alliance.

The PlaceLab, a joint MIT and TIAX LLC initiative, is a residential condominium in Cambridge, MA, that is designed to be a highly flexible and multidisciplinary observational research facility for the scientific study of people and their interaction patterns with new technologies and home environments. The Open Source Building Alliance's goal is to develop key components of a more responsive model for creating places of living where (1) developers become integrators and alliance builders and offer tailored solutions to individuals, (2) architects construct design engines to efficiently create thousands of unique environments, (3) manufacturers agree on interface standards and become tier-one suppliers of components, (4) builders become installers and assemblers, and (5) customers (home buyers) become "designers" at the center of the process by receiving personalized information about design, products, and services at the point of decision.

Mobile Experience Lab

The Mobile Experience Lab focuses on radically reinventing and creatively designing connections among people, information, and physical places using cutting-edge information technology to improve people's lives through meaningful experiences. With a multidisciplinary team, we research and design new technologies and assess their impact on societies, spaces, and communities.

The lab has been working on a number of projects over the past year. Fiber Cloud is an organic sculptural landmark that responds to human interaction and expresses context awareness using hundreds of sensors and more than 15,000 individually addressable optical fibers. Learning Sustainability examines whether mobile technologies and new media can improve youth civic participation and social inclusion, especially in sustainable and environmental matters. Pitti.Mobi rethinks fashion trade shows by creating conversations through real-time mobile tagging. And Smart Urban Mobility Systems explores how the notion of place and media transform urban mobility.

SENSEable City Laboratory

The increasing deployment of sensors and hand-held electronics in recent years allows a new approach to the study of the built environment. The ways in which we describe and understand cities, as well as the tools we use to design them, are being radically transformed. Studying these changes from a critical point of view and anticipating them are the goals of the SENSEable City Laboratory.

The lab is involved in a number of projects. In the province of Florence, Italy, the Wireless City project explores the opportunity offered by wireless connectivity to better understand resource allocation as well as to create new services for its citizens and visitors. The WikiCity project examines how a city can perform as an open-source, real-time system; iFind is a location-based application for "friend spotting." Real Time Rome collected data from cell phones, buses, and taxis in Rome to show urban movement and activity in real time and to illustrate how technology can help individuals make more informed decisions about their environment. Finally, New York Talk Exchange illustrates the global exchange of information in real time by visualizing volumes of long distance telephone and Internet Protocol data flowing between New York and cities around the world.

Smart Cities

The Smart Cities group has two main but overlapping lines of research: concept cars and urban projects.

The concept car project with General Motors aims to reinvent the car and the user's relationship to the car and to the city. Within the concept car project, the "city car" component studied the role of vehicles in the city and proposed the idea of a stackable car for two passengers. The "athlete car" concept allows two drivers to collaboratively control the vehicle and couples body motion with vehicular motion.

The urban projects include the Digital Mile Zaragoza, which proposed a Water Wall, an interactive fountain where people can digitally control the streams of water. Out of this project came the Digital Water Pavilion, an interactive structure made of digitally controlled water curtains that can be programmed to display images or words and will part to admit visitors or objects. The structure will be located at the entrance to Expo Zaragoza 2008, in front of a new bridge designed by Zaha Hadid and will also contain an exhibition area, a café, and various public spaces. The E-lens Project studied how governments and civic institutions could become more responsive and offer better services to citizens and visitors through the use of mobile wireless location-aware technologies. The Smart Mobility project worked closely with the French transportation authority RATP to rethink multimodal urban transportation systems.

Smart Customization

The Mass Customization Interest Group is an MIT-industry collaboration devoted to improving the ability of companies in various industries to efficiently customize products and services for diverse customer groups. This industry interest group brings together the key players in the area of mass customization and strives to become a vital community of practice in this field. The objectives of the group are to increase knowledge of effective and efficient ways to provide custom products and services, to advance "smart customization," and to establish a productive group of executives who exchange information and network with each other and who apply new models, concepts, and the results of the latest research in the field.

Design Workshops

The Design Laboratory offered two design workshops over the past year. Design Without Boundaries I explored opportunities, strategies, and intellectual foundations for radically cross-disciplinary design and was structured as a series of weekly discussions with visitors from widely varied fields. Design Without Boundaries II provided students with the opportunity to pursue real-world design projects that crossed traditional disciplinary boundaries, applied advanced technologies, and addressed significant social issues.

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More information about the Design Laboratory can be found at http://design.mit.edu/.