

Trading Design Spaces: Exchanging Ideas on Physical Design Environments

Panel Moderator

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Panelists

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ABSTRACT

Physical design environments are places that support people engaged in the spatial, physical, tangible act of creation. It is now possible to augment workspaces with an amazing array of technologies to assist users in their creative endeavors. However, the integration of computing technologies into physical environments involves a new set of tools, technologies, principles and practices.

In this panel, researchers working on the challenges of physical design support present their work through a walkthrough of their prototype work environments. Each environment will then be “remodeled” by a fellow researcher using his or her own approach, tools, and design philosophy. The goal of this session will be to explore the large variety of potential applications, tools, technologies, interfaces, and processes used by those working to augment the creative physical world.

Author Keywords

Physical, design, workspaces, tangible, augmented reality, work practice, usability

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI):

OVERVIEW

Physical design environments are places where people are working with tangible tools and corporeal materials to

produce end products. As electronics grow smaller, faster and cheaper, it becomes possible to augment these workspaces with an amazing array of technologies to assist users in their creative endeavors. The spaces, tools and materials of designers, architects, cooks, and engineers could be augmented with displays and speakers to inform and guide their work, networked sensors and actuators to help detect their actions and changes in the environment, and computers to help coordinate all these elements into a cohesive whole.

The augmentation of physical design environments requires feats of engineering, yes, but also sound understandings of human needs and work processes, and a willingness to think of current technologies in new ways meet those needs.

This panel of researchers in the realm of physical, tangible and augmented computing seeks to explore the large variety of potential applications, tools, technologies, interfaces, and processes used by those working to augment the creative physical world.

FORMAT

Our panel format is based on the television show "Trading Spaces," wherein two sets of neighbors get to renovate a room in each other's homes. In our panel, "Trading Design Spaces," each panelist will be paired with another. Each panelist will present a large, annotated image of a design environment that they have augmented, and will make a 10-minute presentation about the features, characteristics, and use of space, and explain how their tools and technologies enrich that design space. Then, their panel partner will have 10 minutes to conceptually “redesign” the space with his or her own technology and tools, sketching into the picture how the design space would be remodelled. We could take five minutes of questions, comments and suggestions from the audience at the end of each pair of redesigns.

The goal of this format is to encourage constructive critique of existing research but also to show how different approaches, technologies and perspectives might lead to result in startlingly different visions of what a creative environment should be.

AUDIENCE

The audience for this panel includes designers interested in applications to support their needs, practitioners interested in creating environments to support physical creative work, and researchers interested in the applications of tangible interfaces, projected displays, augmented reality, gestural input, actuated robotics, or ubiquitous computing technologies. This panel would also appeal to anyone with an interest in novel applications of computer technology.

PANELIST POSITON STATEMENTS

Margot Brereton

How should we design instrumented physical environments to support design knowledge capture and reuse? Design knowledge comes in many forms - sketches, catalogues, physical prototypes. Design is an example of an activity which can benefit from augmenting the physical world with computational devices rather than necessarily completely replacing the physical world with immersive computational environments.

About the panelist:

Margot Brereton is a Senior Lecturer at the University of Queensland, Australia. She holds a PhD from Stanford Engineering in Mechanical Engineering.

Michael Haller

How can people make sense of complicated handbooks, reference manuals or instructions when working in a physical space? Designers often feel that they do not have time to bother with instructions. By using embedded sensors and applying an augmented reality toolkit, we have aided the people in the task of assembling furniture. Extension of such technologies could enable people to tackle larger-scale projects, like assembling machines, and enrich user's interactions with their physical surroundings.

About the panelist:

Dr. Michael Haller is a professor at Upper Austria University of Applied Sciences, in the Media Technology and Design Department. He is the Project Manager of AMIRE, an Augmented Reality Authoring Framework.

Hiroshi Ishii

Tangible Bits seeks to realize seamless interfaces between humans, digital information, and the physical environment by giving physical form to digital information and computation, making bits directly manipulable and perceptible. The goal is to blur the boundary between our bodies and cyberspace and to turn the architectural space into an interface.

About the panelist:

Hiroshi Ishii is a professor at the MIT Media Lab. He received B. E. degree in electronic engineering, M. E. and Ph. D. degrees in computer engineering from Hokkaido University, Japan, in 1978, 1980 and 1992, respectively.

Scott Klemmer

Tangible user interfaces augment the physical world by integrating everyday physical objects with digital information. We created Papier-Mache to help build tangible user interfaces using computer vision, electronic tags and barcodes, to allow such interfaces to be built by developers who are not graphics hardware experts. To do this, we have investigated objects, interviewed designers, developed and tested widgets for making interfaces that exist in the physical domain.

About the panelist:

Scott Klemmer is a senior doctoral student in the Group for User Interface Research at UC Berkeley, under Professor James Landay. He will be graduating in May 2004.

Brian Lee

The Stanford iRoom is actively pursuing research on the intersection of HCI and systems problems that arise in deploying, operating and developing applications and human interfaces for a physical interactive room, including multi-device, multi-user applications, multimodal and fluid interaction. Reusable, robust, and extensible system software, integration of large (wall-sized) displays, and integration of computing "appliances" including PDA's, scanners, digital cameras, etc. into an iRoom.

About the panelist:

Brian Lee is a senior PhD student in the Human Computer Interactions Lab at Stanford University. He received his undergraduate degree in EECS from UC Berkeley.

Dan Rosenfeld

Wide availability of human-centric, computer-mediated active manipulation of objects has the potential to lead to fundamental improvements in the ways people use computers for problem solving and cooperative planning. The Planar Manipulator Display is a novel device that enables simultaneous planar movement and sensing of multiple physical objects. Interaction mediated by computer-controlled objects will improve understanding and collaboration in many types of simulations for which screen-based interaction is not optimal.

About the panelist:

Dan Rosenfeld is a Research Scientist in the Center for Advanced Technology at the Media Research Lab, New York University.

Panel members:

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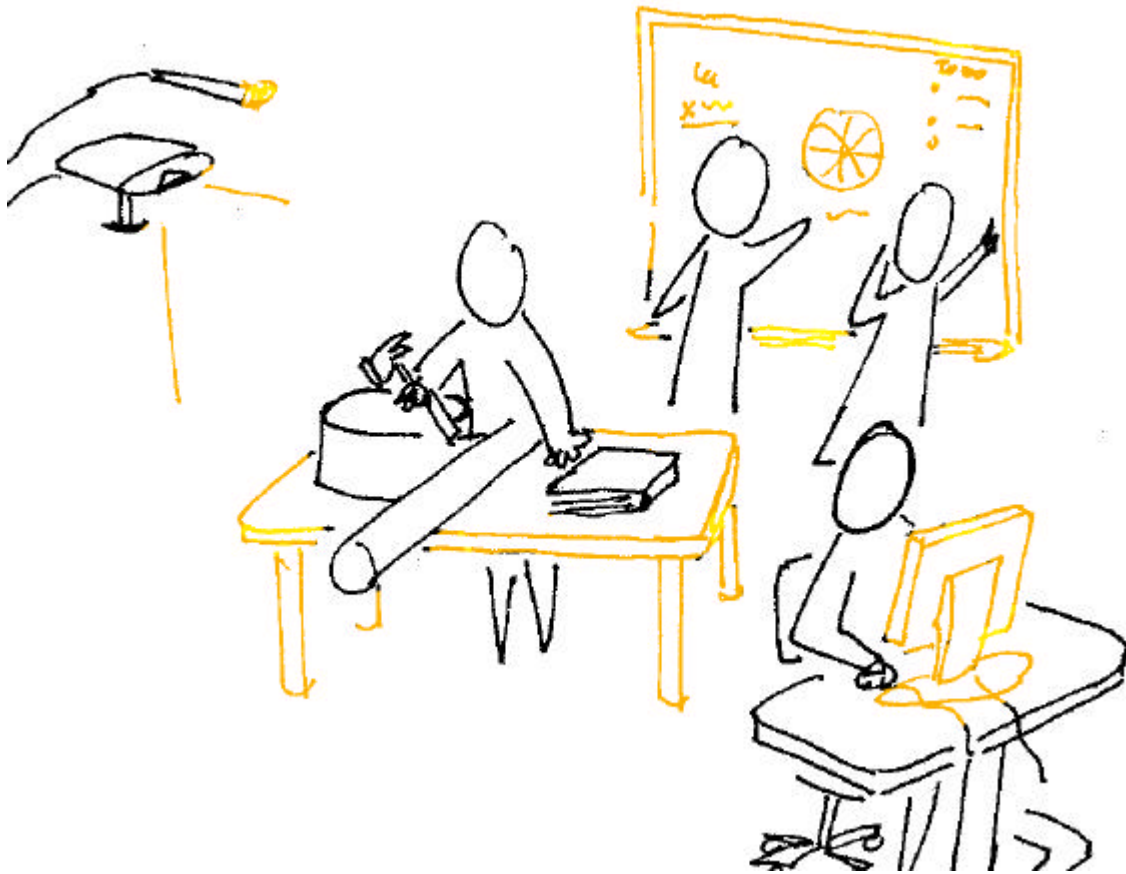
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Topic: Physical Design Environments

The need to connect to designers in the CHI community and practice has been a recurring theme within CHI in recent years. One aspect of this need is changing the way computer interfaces work so that they more adequately suit the needs of designers or others engaged in creative tasks—tasks that are spatial, tactile and physical.

This panel convenes a number of researchers working on innovative physical environments targeted for practitioners of creative use. It will explore different applications, methods, technologies, tools, principles and practices are used in this domain in a fun and engaging format.

Technology

No special technology is really required for this panel. We will need a large room with a projected display. It would be nice to have a document camera or a tablet PC to give the researchers something to mark up each others annotated workspace images with, but we could manage without, as well.