

# Co-opting Everyday Objects

*Elizabeth D. Mynatt*  
Everyday Computing Lab  
Graphics, Visualization and Usability Center  
Georgia Institute of Technology  
Atlanta, GA 30332-0280, USA  
+1 404 {894-7243,385-1102}  
mynatt@cc.gatech.edu

**Keywords:** augmented reality, awareness, ubiquitous computing, light-weight interaction, audio, visualization

## INTRODUCTION

The promise of augmented reality is to re-invent the physical space that surrounds us. Occasionally there is the opportunity to create something completely new, but much more often our task is to mix old patterns together in a different way, building this new world on top of the foundation of the old. In short, we co-opt the common things that surround us as the basis for our new creations.

In this paper, I take an all-encompassing view of augmented reality that is often also attributed to the work in ubiquitous computing. Namely that computation pervades our everyday environments, whether visible or invisible, it is intertwined with our daily experience. From my work as an experienced researcher and a acolyte designer, I want to initiate a discussion about how we augment the physical world by first understanding how people currently use common everyday objects, and then designing new capabilities that reify and enhance these practices.

This methodology sounds simple. Take a common object, say a coffee cup, and add computation. Perhaps it measures how warm the coffee is. Maybe it keeps count of how much coffee you drink. Or should its color indicate if a close friend is also drinking coffee as well. The challenge is turning good intentions into a useful and usable design.

My methodology has been to engage a conversation of three voices: the ethnographer who tries to understand the often informal and implicit practices associated with everyday objects, the designer who strives to create something new that is both aesthetically pleasing and functional, and the HCI researcher who often manages the conversation while striving to build and evaluate this new creation. In the following four projects, I briefly describe different versions of this conversation, its goals and pitfalls. Two projects are completed, allowing easier retrospection, and two are on-going and would benefit from the workshop discussions.

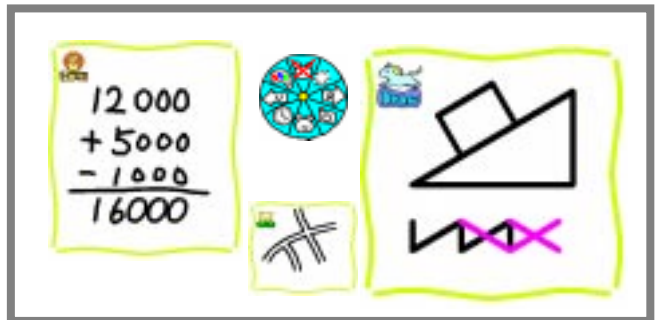
Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, to republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.  
DARE 2000 April, 2000 Elsinore, Denmark  
Copyright ACM 2000 1-58113-367-7/00/04 ... \$5.00

## AUDIO AURA

Ironically, this first project<sup>1</sup> does not involve augmenting an object, but augmenting the auditory ambiance that “surrounds” a physical space, in this case the office spaces in Xerox PARC. Briefly, the intent was that users would hear information in the background audio associated with different spaces, e.g. the past presence of a colleague in their empty office. This design suffered from the lack of a strong ethnography voice. Although informed by an insider’s knowledge of PARC practices, the effort was consumed by creating a working system and designing the auditory landscape. Although significant contributions were made on both of those fronts [6], the lack of a strong connection between the designers and the user community allowed the design to quickly follow its own path making deployment and evaluation difficult.

## FLATLAND

The goal of Flatland was to augment whiteboards in individual offices, i.e. not meeting rooms, to better support informal work practices. Although the work likely suffered from picking the artifact early in the design process, a strong and continual connection between an investigation of whiteboard practices [5] and the design and implementation of the system [4] invigorated the design so that the many “course corrections” in the design process were strongly influenced by everyday practices. A simple litmus test is the large number of people who wanted the system in their office immediately when it was ready to deploy. The visual and interaction design was also guided by a strong aesthetic voice. This fusion of strong voices resulted in a design that was engaging such that the interaction matched its use, and its use matched the informal practices of its intended users.



**FIGURE 1. Augmenting an Office Whiteboard**

1. For lack of a better organization scheme, the projects are presented in chronological order.

## DIGITAL FAMILY PORTRAITS

The two remaining projects are current efforts in connecting extended family members living in different homes, perhaps separated by many miles and time zones. From observations at assistive care centers for senior citizens, and interviews with seniors, either living on their own or at an assistive care center, and their adult children, it became clear that the lack of a daily connection to reassure that an elderly parent was doing fine was a significant reason for instigating a transition to an assistive care center. From this need, we are working on multiple designs that provide a socially appropriate level of awareness between family members via an aesthetically pleasing household object.



**FIGURE 2. A series of 5 images consisting of 4, 10x10 pixels**

### Digital Family Portraits

In this design, we have co-opted the picture frame typically surrounding a posed picture. The icons in the frame represent levels of activity, relationships, health and special events. Assuming that future house technologies automatically sense information about the occupant [1], current information and past trends are depicted in the frame.

In our first field trial, we created frames for a grandmother and her two grandchildren using daily interviews in lieu of sensing technology. Although they found the design engaging and useful, we still have much work to do in making the frames comprehensible and aesthetically pleasing [3]. During the field trial, the daily interviews gave us a better sense for what information was appropriate to transmit between family members. Understanding the complex relationship between adult child and elderly parent is still a significant hurdle.

### Ten Inch Pixels

In this design [2], we are more interested in creating an artistic object than an information appliance. Four panels containing five images (each is 10" by 10") painted in oil are woven together in a mechanically moving picture. Each panel can be moved independently



**FIGURE 3. Digital Family Portrait Example**

to create one of five "coherent" images and hundreds of mixed images. The intent is that transitions in the picture will trigger associations with an extended family member.

## CONCLUSIONS

Balancing the three voices of the ethnographer, the designer and the HCI researcher is an important, but difficult challenge in creating augmented reality systems. The past projects illustrate different proportions in the three voices and subsequent pitfalls. The current projects continue to challenge us in creating useful and usable designs that are well-grounded in current needs and practices.

## REFERENCES

- [1] Kidd, C.D., Orr, R., Abowd, G., Atkeson, C., Essa, I., MacIntyre, B., Mynatt, E., Starner, T. and Newstetter, W. (1999) "The Aware Home: A Living Laboratory for Ubiquitous Computing Research." In the *Proceedings of the Second International Workshop on Cooperative Buildings (CoBuild'99)*.
- [2] Mankoff, J., Rowan, J., Mynatt, E.D., McJunkin, M. and Hudson, S. (under review) "Ten Inch Pixels: Dynamic Ambient Art" Submitted to the 2000 ACM Conference on Human Factors in Computing Systems (CHI'00).
- [3] Mynatt, E.D. and Rowan, J. (under review) "Cross-Generation Communication" Submitted to the 2000 ACM Conference on Human Factors in Computing Systems (CHI'00).
- [4] Mynatt, E.D., Igarashi, T., Edward, W.K., and LaMarca, A. (1999) "Flatland: New Dimensions in Office Whiteboards," in the *Proceedings of the 1999 ACM Conference on Human Factors in Computing Systems (CHI '99)*. Pittsburgh, PA, 346-353.
- [5] Mynatt, E.D. (1999) "The Writing on the Wall," in the *Proceedings of INTERACT'99: Seventh IFIP Conference on Human-Computer Interaction*, Edinburgh, Scotland, International Federation for Information Processing, Laxenburg, Austria, August 1999.
- [6] Mynatt, E. D., Back, M., Want, R., Baer, M. and Ellis, J. (1998). "Designing Audio Aura," in the *Proceedings of the 1998 ACM Conference on Human Factors in Computing Systems (CHI'98)*, Los Angeles, CA., 566-573.