# Ambient Performance and Spectatorship in the Workplace

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## Abstract

Building with a Memory is an experiential media system for capturing and representing dynamic human activity in a distributed workplace. Participants can perform purposefully, incidentally and unknowingly with the system, with individual and collective actions represented through a variety of ambient feedback mechanisms. Two iterations of the system are presented and observations and recommendations for performative workplace media systems described.
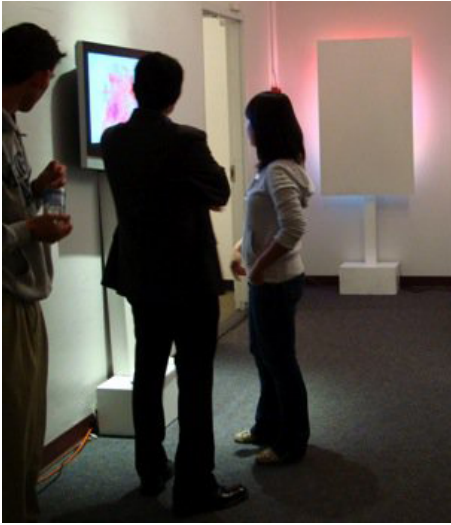
In this paper we discuss the performative aspects of *Building with a Memory*, an experiential media system for capturing and presenting patterns of human activity in a transdisciplinary workplace.  The indirect mapping between performance and feedback challenges how we consider performativity in the piece.

## Keywords

Ambient Art Interventions, Performative Spaces, Data Visualization

## ACM Classification Keywords

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

**Figure 1:** *A Building with a Memory* installation.



**Figure 2:** Data from fixed and mobile sensors is aggregated by the *Building with a Memory* system and provided to fixed and mobile feedback devices.

## Introduction

*Building with a Memory* is an experiential media system[6] situated in a transdisciplinary, multi-purpose workplace. The system captures information about human activity, particularly movement, through fixed video-based sensors and Android smart phones running a mobile application. The activity is analyzed and rendered through situated flat panel displays, variable-color indirect lighting fixtures, and a mobile application (**Figure 1**; system diagram in **Figure 2**). *Building with a Memory* aims to be ambient and unobtrusive, enhancing the space without overpowering it while providing valuable information.

Many interactive art installations deal with ideas of memory in space, either explicitly [1] or implicitly (Utterback's *Aurora Organ* or *Abundance*; Snibbe's *You Are Here*; Rokeby's *San Marco Flow*). In works like *Impossible Geographies* [3] and *Abundance,* users' actions map directly to projected feedback, making the connection between interaction and feedback clear. In *San Marco Flow* and *You are Here*, the sensed space is separate from the space in which feedback is generated. As a result, the people being sensed while performing their everyday activities may not be aware that they are contributing to an interactive art piece, and have no investment in the outcome.

Additionally, these works vary in their approach to representing a history of performance. *You are Here*, *San Marco Flow*, and *Abundance* represent motion-trails left by people moving through the space. *Aurora Organ* records a history of interactions with the sculpture in its' LED pillars; *Impossible Geographies* records and displays video. Each of these interactions favors
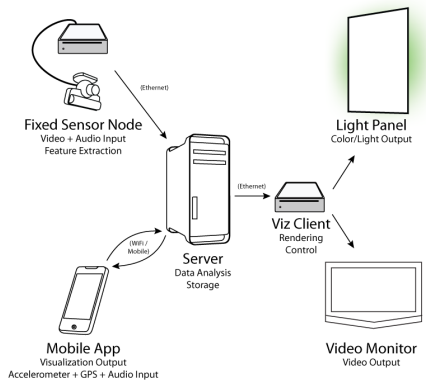
different types of performance – micro or macro, intentional or accidental.

We consider the role of performativity in interactions with and around *Building with a Memory*. We consider as performers both the "users" who are sensed by the system, and "spectators" who observe the system and those directly interacting with it. The barrier between user and spectator is fluid: the "user," through time, transitions between performer-for-the-system, to performer-for-the-spectator, to performer-for-one's-self, to observer of others' explicit performances [1]. Spectators may become users, and users spectators, as people enter or withdraw from explicit interaction with the system.

These transitions are explored in *Building with a Memory*. Due to the distributed sensing and feedback, a participant may be sensed without receiving feedback, receive feedback without being sensed, or experience both at once. In an otherwise empty room, a performer may in fact be captured, her actions factored into visualizations apparent to people in other areas, or perhaps outside of the building entirely. Additionally, individual interactions play a relatively small role in shaping the visualization at any given moment in time, in comparison to the sum of historical interactions over hours or days. As such, any individual performance is immediately placed into context as part of a pattern of activity.

## Building with a Memory and Performance

*Building with a Memory* is situated in the middle of the continuum between real-time and observed feedback, and delayed/unobserved feedback. The system, as illustrated in Figure 2, uses both fixed and mobile-

phone-based inputs to analyze the level and type of human activity throughout a semi-public classroom, lab, workshop, and multipurpose spaces of a transdisciplinary academic school.  This activity is displayed through both mobile and static visualizations.

The system is intended to serve both aesthetic and utilitarian concerns:  the ambient visualizations enliven the workplace, and the information they present about current and past activity levels is useful to community-members planning activities or attempting to understand the rhythms of the community. The system aims to employ primarily *unfocused* interaction, where users being sensed are at most peripherally aware that their actions are feeding into the system, and observers are peripherally aware of the information provided, but interaction does not dominate the physical or social space in the building [1].

The first room-scale iteration of *Building with a Memory* was an exploration into many of the ideas discussed here. This first iteration of the system used a single video camera for sensing activity in a reception space, coupled with two backlit light panels and a video display [2]. In this installation, every user sensed by the display was able to directly observe the video display and colored lighting feedback.  While the display did aggregate motion over time, individual contributions were still directly visible. We observed several of the behaviors discussed in [1]. When observers realized that the on-screen visualization was tied directly to motion, they began gesticulating wildly (explicitly performing) while observing the screen for evidence of their performance. Other spectators, observing this behavior, joined in moving from spectator to performer.

The second building-scale iteration of *Building with a Memory* is designed to address this limitation and will be installed in February, 2011. Since the system is concerned with aggregated data from many sources, the relationship between any individual's actions and the majority of the visualizations is not as clear as in *Abundance* or *Impossible Geographies*. The distributed sensor system covers areas where no feedback is present, and provides feedback in non-sensed areas, as in *San Marco Flow* or *You are Here*.  The piece is installed in a working space, however, and aims to increase engagement by making the people living and working in that space invested in both the performance of their roles as students and workers, and the performance within the *Building with a Memory* system.

*Building with a Memory* examines trends and patterns in activity over time, so it is possible for a user to witness the results of his or her everyday performance as an audience member.  In a certain sense, *Building with a Memory*'s performer is the community as a whole rather than an individual actor(s). By performing their day-to-day activities, community-members perform the detected events that *Building with a Memory* recalls.

In *Building with a Memory,* some sensor nodes do not have feedback devices nearby.  The mobile-phone application can, if enabled, sense data even when not providing feedback.  As a consequence, it is possible for people to perform for the system with no direct feedback.  In some spaces, such as the building entry hall, both sensing and feedback co-exist, creating the more traditional experience of performing both for the media system, for one's self, and for others simultaneously. These different forms of performance,

both on behalf of the system and those who inhabit the space, challenge the conception of human-computer interaction and performance as always involving a self-aware performer, spectators, and the system [1].

Also, through the mobile interface, the user may simultaneously observe the system and contribute to it, in terms of location, sound level, and motion data. This re-creates some of the potential for the performance-observation positive feedback loop experienced in iteration one, but hopefully in a reduced intensity.

To address issues of workplace security and privacy, both current and previous iterations of *Building with Memory* are designed to respect individual privacy. While the sensor technologies we employ could be used to identify individuals, we opt instead to identify patterns and more general features – motion, level and type of audio, and so forth.  This limits the potential negative consequences of engaging with the system, in terms of individual attention, while allowing us to capture the larger-scale dynamics of the everyday performance in the building.

## Open Questions and Future Work

Since the *Building with a Memory* system is installed in a workplace, the system raises a number of concerns in terms of privacy and observation of day-to-day performance.  If outsiders visiting the building evaluate the community based on the patterns observed in *Building with a Memory*, will members of the community feel pressured to perform in ways that appear favorable in the feedback? Will pressure exist to "work to rule" when the system is watching?

Additionally, while the new system focuses on larger aggregates rather than individual activities, will members of the community work together to intentionally influence the visualizations?

In the future, we plan to investigate both qualitative and quantitative evaluation of our system and how it affects the community and individual performers. Analyzing the data from the mobile app may also reveal how often the community chooses to submit data and how often they choose to be spectators.

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