

Nurturing Technologies in the Domestic Environment: Feeling Comforted, Cared for, and Connected at Home

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ABSTRACT

This workshop will explore the potential for technology to support the experience of being nurtured in the home. Emerging practices (observed or imagined) around nurturance in the home will be explored using the lenses of architectural space and social context. These practices will inform proposals for the design of technology that nurtures people for a variety of domains including healthcare, entertainment, education, spiritual practice, and communication. The goals of the workshop are to 1) gain an understanding of emerging practices of using technology for nurturance and 2) propose designs for nurturing technology.

Keywords

Architecture, boundary management, conflict resolution, domesticity, education, emotional response, environmental design, home, nurturance, privacy, sanctuary, social connections, spirituality, stress, wellness.

INTRODUCTION

The relationship between the public sphere and the domestic realm in Western culture has changed repeatedly from the Middle Ages through industrialization. In the Middle Ages there was no expectation that a home should be private, and employees worked and slept in their employers' living rooms [17]. The belief that homes should be private areas accessed exclusively by family members emerged from the Victorian era, when men from all social classes began working outside the home, and middle-class people stopped having live-in servants. Although the Victorian ideal of the home as a refuge from the stressors of the business environment lingers on, changing expectations in the workplace, such as assumptions about availability and the rise of tele-work, have undermined that vision. When we work from home or respond to business email in the middle of the night, our employers, clients, and co-workers are once again inhabiting our homes.

Changes in work life aren't the only pressure on the home; the proliferation of devices within the home and abundance of digital media can be additional sources of stress as entertainment devolves into information overload. These pressures quickly co-opt technology into a dystopian vision: computers and phones eroding free time by making workers always accountable, television and video games

stunting the healthy development of children (and adults), personal "cocooning" technologies encouraging withdrawal from family life.

Although numerous projects have explored embedding computation in the domestic environment [2, 5, 11, 16], the potential for technology to provide the experience of being nurtured, or *nurturing technology*, is under-explored in ubiquitous computing research. By "nurturing technology" we refer to technologies that support emotional relationships in the home, producing feelings of being comforted and cared about, technologies that help people thrive. This workshop will address the lack of work in this area by 1) examining emerging practices of using technology for nurturance and 2) envisioning technology to support it. Instead of advocating a utopian position of domestic technology providing experiences that meet all our needs for physical comfort and emotional connection, this workshop will explore a middle ground: ways technology can provide the experience of being nurtured while grounding that experience in the practices of inhabiting a home, in all their real-world complexity and ambiguity.

PRACTICES AROUND NURTURANCE IN THE HOME

Of the many possible lenses for exploring nurturance, this workshop is particularly interested in exploring two: physical architecture and the social context of the home.

Physical Architecture

Different environments afford different activities, and the plan of a house has far-reaching implications for how it is inhabited. Open-plan lofts engender different behaviors than suburban ranch houses partially because in the former the lack of visual and acoustic separation causes some activities, such as listening to music while cooking, to disrupt simultaneous activities, such as concentrating while reading. In ranch houses, rooms and perhaps activities are instead hard-coded into the plan using interior walls and doors.

In *House Thinking*, Winifred Gallagher provides a "room by room" look at how these issues of territoriality, privacy, and control are played out in the American context, sharing stories about self-presentation in entryways and the relationship between clutter, storage, and calm in the dining room [17]. This architectural perspective to understanding

the built environment has valuable lessons for technology designers, such as how to design to encourage socializing versus to support solitude. A key challenge limiting the ability of technologists to apply lessons from architecture is the difficulty of encoding design knowledge. Some books prescribe canonical examples to be used as exemplars in the design of other spaces. For example, *A Pattern Language* and *The Not So Big House* specifically promote notions of coziness that align well with the idea of nurturance [1,19].

During the workshop we will use teachings from architecture and design psychology to both *describe* current patterns of inhabitation and *prescribe* ways of supporting nurturance in the home using technology.

Social Contexts

As the history of work in the home suggests, designing nurturing technologies involves dissecting assumptions about what the home is and what it means (and whether it is desirable) to nurture there. Homes are tremendously variable, and the housing type, size, number of inhabitants, expectations about noise level, and desires for privacy depend on the environment in which the home is situated. The social and environmental context changes over time, as does the available housing stock, but the two do not necessarily remain in step. The traditional Chinese goal of having multiple generations under one roof is not possible if the young people live in single-sex dormitories at their workplace. Some would argue that the kitchen in many Manhattan apartments is vestigial, and the oven is more likely to be used for storage than food preparation in an era of extended workdays and take-out food.

The social context of the home is not monolithic and the home may be experienced in radically different ways by people within the same household. Gender differences are particularly relevant because the home has traditionally been a place of labor for women. Much of the discussion about ubiquitous computing in the home focuses on the home as a place of leisure, rather than of work, with Rode et al.'s work on domestic economy a notable exception [14]. In the context of nurturing technologies, it is important to note that homes are not always safe havens from the outside world. They may be full of screaming children that need attending after a long day of office work, and they can be physically unsafe—sites of mishaps ranging from minor accidents to domestic violence and other violent crimes.

Both modalities of home as a place of leisure and a place of work are relevant for a discussion of nurturing technology in the domestic realm, although technology to support each mode may differ widely. Nurturing technologies themselves exist in an environment in which technology often tends to encourage more work, entertainment, information, and activity rather than nurturing. Successful design of technology for nurture therefore requires questioning assumptions about the domestic environment and the role technology can and does play in it,

assumptions that may be difficult to break because of daily reinforcement from personal experience. Nurturing technology is a good candidate for new kinds of design practices like cultural probes [7], defamiliarization [4], reflective design [18], alien presence [15], and attention to boundary work [12] that encourage reflection on cultural context and assumptions.

APPLICATION AREAS

Discussion of nurturance is relevant to many application areas, and a goal of the workshop is to foster cross-domain collaboration. The following are some relevant application areas:

Healthcare

Home health monitoring is a pressing social need, driven in part by the aging population. Previous research in ubiquitous computing research in this area has generally emphasized medical data processing over discussion of the potential for the technology to actually nurture the person using it, with some exceptions [5, 16]. Stress reduction and emotional wellbeing are aspects of healthcare closely connected to nurturance, and perceptions of technology are already closely connected to both needs. Design questions include: What kinds of domestic technology could heal people, or help keep them well? How can technology address a group's "health," not just an individual's health? What alternatives to medical frameworks show promise in this domain?

Entertainment

The dominant modes of most current entertainment technology are escapism (e.g. so called "mindless" television) and connection to others (e.g. online gaming). This dichotomy also emerges in discussion of physical space because, like home design, some entertainment technologies afford bringing people together while others afford shutting them out. Audio-visual equipment is also a way of controlling domestic space, and the source of conflict in multi-person households [13]. Design questions include: How might entertainment technologies change if they were explicitly designed to support nurturance? What is the impact of on-demand, controllable media delivery systems like TiVo?

Education

Many homes are places in which children are nurtured, acculturated, and (informally and sometimes formally) educated. Adult education and development also takes place in the home, but the case of children is particularly central and problematic, given their vulnerability, lack of autonomy, and developmental needs. How can new forms of technology help in the domestic nurturance and education of children, and of adults? How does the role of nurturing technology differ by lifestage? What new forms of "home schooling" might be possible?

Spiritual Practice

Meditation and prayer are ways of staying grounded in a chaotic world; they nurture the spirit. Little work has been

done exploring the intersection of technology and spirituality, with some exceptions [3, 10]. As greater numbers of the world's people begin using computers and go online, the discussion about technology will continue to shift away from optimizing productivity towards a more holistic version of the human experience, which for many people includes religion as a central component. Grounding the discussion of spiritual experiences in the built environment also has the potential to more richly evoke the context in which those ephemeral experiences take place, leading to design questions such as how technology might be integrated into the religious objects (e.g. books, candles, cups, icons, prayer rugs, etc.) kept in the home.

Communication

Activities related to healthcare, entertainment, education, and spirituality happen outside as well as inside the home. Yet the home remains as a social and economic unit, one which acts as a source of social support and a primary reference group for members of the household. Social interactions in support of those relationships are one of the key activities taking place in the home. Technology can have a dramatic impact on the nature of social connections between household members and remote family and friends, as well as enabling interactions with people one has never met face-to-face. Design questions include: How does technology support people's needs for social connection? Does technology reinforce or undermine the home as a socio-economic unit?

Application area interactions

We recognize that even these few areas—healthcare, entertainment, education, spirituality, and communication—interact in exciting ways. How do spiritual practices contribute to physical health? How can entertainment promote health? What new forms of religious (or nonreligious) home schooling can new technologies enable? As additional areas are brought into a discussion of nurturing technologies the conversation can become even richer. To prevent the workshop from being too diffuse to be useful, the discussion of any application area will be firmly grounded in the context of the home, along both spatial and social dimensions.

SUBMISSIONS

We welcome submissions from technologists, social scientists, designers, and architects and we will use our diverse backgrounds to find common ground between participants. Submissions should be a position paper of 2-4 pages on any topic related to technology in the home and nurturance. We are especially interested in collecting examples (observed or imagined) of nurturing technology. Negative examples of invasive or harmful domestic technologies are also welcome, particularly if they suggest positive corrective possibilities. Descriptions should include as much detail as possible about the physical spaces

and social contexts in which they are embedded. We welcome provocative submissions. These are some example questions position papers might address:

- What are unintended consequences of nurturing technologies? Can an environment be too nurturing for the occupant's—or society's—own good?
- To what extent is technology itself responsible for the problems nurturing technology is intended to solve? Is living in a smart home so stressful it makes you ill?
- What disciplines must be brought together, and how, to effectively research nurturing technology?
- Can TV be a form of nurturance? Can talking on the telephone? Communicating or playing online?
- How can knowledge about nurturing technology be encoded and shared with others?

DESCRIPTION OF THE WORKSHOP

This one-day workshop will mix presentations, hands-on activities, and discussion in small groups and as a whole.

Goals

The goals of this workshop are to 1) gain an understanding of emerging practices of using technology for nurturance and 2) propose designs for nurturing technology. We expect to collect a wide-range of examples of nurturing technology and use those to inform the design of other kinds of experiences that are embedded in a particular physical and social context. At the end of the workshop we will have a list of challenges and design ideas organized by space and domain. The secondary goal is to enrich current discussion of ubiquitous computing in the home by bringing in ideas from architecture and cultural theory.

Proposed Activities

To seed the discussion, participants will be given an advance assignment of a design psychology exercise about the physical interior of a home they found appealing from a nurturance point of view. The exercise will be derived from similar exercises found in *House as a Mirror of Self* and *Some Place Like Home* [8, 9]. Participants should be able to be complete the exercise in 30-40 minutes.

This is a draft agenda for the day of the workshop:

- Brief presentation by the organizers to explain the goals and methods. The basics of design psychology will be covered to allow participants to view the individual presentations through the lenses of physical space and social context.
- Brief presentations by each participant to help identify common areas of interest. The presentations will consist of sharing 1) the outcome of the design exercise and 2) their research interests as described in their position papers.
- Small group brainstorming exercise. The organizers will divide the participants into teams of 3 or 4 to transition from the commonalities of their design exercises into examples of technologies to support nurturance. The

teams will be given materials to structure their discussion in terms of collecting examples of nurturance.

- Report back to entire group. Each team will share the outcome of their discussions with the entire workshop. The workshop organizers will document key ideas on sticky notes, and participants will be able to also.
- Clustering sticky notes. The group will make affinity diagrams to expose topics relevant for supporting a research agenda in nurturing technology.
- Small group discussion. Participants will put themselves into small groups based on topics of interest from the affinity clusters. The organizers will encourage division of labor between groups, one group exploring a particular space of interest (e.g. technology in the kitchen or bedroom), another by domain (healthcare, entertainment, etc.), and so on. Each group will produce two slides documenting their discussion. One slide will identify the most pressing challenges in their chosen area and the other will describe proposals for technology to support nurturance.
- Presenting design ideas to the group. Each team will present their slides. The slideshow will be assembled and shared with the group.

Methodologies and Take Aways

The design psychology exercise will be derived from current best practices [8, 9]. Structured brainstorming and affinity clustering will be used to produce and organize ideas. Each participant will receive a paper copy of all the position papers. The workshop's web site will be updated with the final summary slide show, as well as photos from the event. If participants give us permission, we will add their individual design psychology exercise to the website. Because this area of research is nascent, the most important take-away will be connections between participants. Participants will have the ability to add themselves to a distribution list designed to keep the discussion going.

LOGISTICS

After participants have been selected, we will send everyone a design exercise assignment to complete before the workshop. The organizers will be available via email for clarifications and examples, along with the accepted position papers, will be posted on the workshop website: <http://www2.parc.com/csl/members/aelliott/nurturance>

Selecting Participants

Participants will be selected on the basis of a 2-4 page position paper which will include discussion of their interest in the topic of nurturing technologies in the home as well as a description of their experience and a biographical paragraph. This workshop will be of interest to researchers designing technologies for the home in multiple application areas and we intend to draw from a diverse group. Because of its emphasis on physical space, we anticipate the workshop being especially attractive to designers and people interested in making artifacts. To insure a range of participants from diverse backgrounds we

will advertise the workshop on blogs and mailing lists targeting industrial and academic audiences. Fifteen participants will be selected.

Workshop Organizers

The organizers come from diverse backgrounds in architecture, computer science, cognitive psychology, and cultural theory.

- Ame Elliott is a research scientist at the Palo Alto Research Center (PARC). She uses ethnography and interaction design to explore inhabitation in the home and on the street. Her research interests include technologies for leisure and wellbeing and methodologies for design decision-making. She has a Ph.D. in Architecture from the University of California, Berkeley and a Bachelor's of Environmental Design from the University of Colorado, Boulder.
- Scott D. Mainwaring is a senior researcher in the People and Practices Research Lab (PAPR) in Intel Research, where he conducts ethnographic fieldwork to understand sources of technological value. His research interests include privacy and temptation management, mobile practices, and cultural differences. Scott has a Ph.D. in Cognitive Psychology from Stanford University, and an A.B. in Computer Science from Harvard University.
- Phoebe Sengers is an assistant professor in Information Science and Science & Technology Studies at Cornell University. She develops culturally embedded systems; i.e., interactive technologies that respond to and encourage critical reflection on the place of technology in culture. She holds a Ph.D. in Artificial Intelligence and Cultural Theory from Carnegie Mellon University and a B.A. in Computer Science from Johns Hopkins University.
- Allison Woodruff is a researcher at Intel Research Berkeley. Her primary research interests include technologies for domestic environments, computer-mediated communication, ubiquitous computing, and information visualization. Woodruff holds a Ph.D. in Computer Science from the University of California, Berkeley; an M.S. in Computer Science and an M.A. in Linguistics from the University of California, Davis; and a B.A. in English from California State University, Chico.

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