

# Position Statement: Memory Matching in Support of Interpersonal Communication

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## INTRODUCTION

This position statement consists mostly of a (previously unpublished) research proposal that was recently prepared by the authors. At the time of this writing, it is unclear to what extent the proposal will be funded, but in any case it describes the authors' ideas and relevant experience with regard to a topic that should be of interest for this workshop: ways of leveraging novel technologies to enhance traditional interpersonal encounters. The proposal refers explicitly to intelligent home environments, but analogous points can be made with regard to other types of technology discussed in the workshop.

## PROPOSAL TITLE AND ABSTRACT

*Title:* ConversationPiece: Memory Matching in Support of Interpersonal Communication in Intelligent Environments

*Abstract:* Although intelligent environments can tend to reduce their users to passive consumers, they also generate information that a system can leverage for the support of rich interpersonal communication. The CONVERSATIONPIECE project builds on research by the contributors and others on the construction of artificial personal memories, the sharing of experience, and social matching. By performing *memory matching* on the artificial memories built up for two individuals within an instrumented environment, a CONVERSATIONPIECE system will suggest topics of common interest and bring about communication that would otherwise not have taken place. The design and development process will be user-centered, comprising a study of scenarios and user requirements, iterative design and testing of the user interaction and the internal processing, and evaluation in a naturalistic setting. The ultimate goal is for the basic conception to be transferred to a variety of types of intelligent environment.

## RESEARCH DESCRIPTION

### Background

Intelligent environments—whether in the home or in public places—have the promise of offering people easier and greater access to device functionality, entertainment, services, and products. A downside is that they can reduce their users to passive consumers who no longer even have to push buttons in order to get what they want. In particular, the need for and interest in interaction with other persons—whether family members or strangers—can be diminished when support from intelligent environments is increased.

That people still do want and need to communicate is shown by the enormous popularity of technology that supports more or less direct interpersonal communication, ranging from SMSs, instant messages, and blogs to more sophisticated systems for the sharing of experiences. But this technology does not in general help to ensure that people have something worthwhile to communicate about in the first place.

The basic idea of the CONVERSATIONPIECE project is to exploit typical by-products of intelligent environments—namely, automatically constructed records of human activities and contexts—to facilitate beneficial forms of human-human communication, whether via face-to-face conversation or via technological channels.

The research will build directly on recent and current research by the contributors on closely related topics, which yields not only relevant experience but also software components that can be reused in the CONVERSATIONPIECE project. This relevant previous research is summarized toward the end of this document in Section .

## Project Details

### Vision Statement

Consider the following scenario: John and Mary live in the same modern household, which offers personalized news and entertainment services. Whether via radio, television, PDA, or a traditional PC, John and Mary can effortlessly access programs and information of interest to them, because the intelligent environment in their home has learned their interests and preferences. The more effective the intelligent environment becomes, the less interesting John and Mary may become to each other as sources of information and entertainment. Since an essay on the various possible consequences of diminished interpersonal communication would exceed the scope of this brief proposal, we will assume agreement on the general point that the consequences are at least partly undesirable.

Suppose, however, that John and Mary also possess a CONVERSATIONPIECE, a system that can access and process the information collected by their environment about their consumption of news and entertainment. At any appropriate time, John or Mary (or both jointly) can ask the CONVERSATIONPIECE for ideas about what to discuss. For example, on Thursday evening John may have watched a documentary about social unrest in France, and on Friday morning Mary

may have read a news report about a related specific development. An exchange of ideas and feelings about these experiences may be a welcome alternative to further individual media consumption; but the specific topic is likely to be one that John and Mary might never have hit upon themselves, even if they had actively searched for topics of common interest.

Many analogous scenarios are imaginable, involving different user groups and types of intelligent environment: Shoppers might enjoy communicating about closely related shopping experiences; and elderly persons living in an assistive environment might appreciate being able to talk about the everyday coping problems that they share.

We will refer to the identification of related experiences through the comparison of artificial memories as *memory matching*. (The matching process accesses the artificial memories of the persons involved, but in many cases the corresponding human memories will also include traces of the experiences identified.)

#### *Objectives*

The overall objective of the CONVERSATIONPIECE project is to create a solid foundation for systems that facilitate communication through memory matching systems. More specifically, we will map out the space of scenarios, user interfaces, and technical realizations, and we will design, implement, and test one proof-of-concept prototype within this space. The ultimate goal is that designers of intelligent environments should be encouraged and supported in efforts to derive positive side effects in terms of the support of interpersonal communication, even while pursuing the goals that originally motivated the design of their intelligent environment.

#### *Expected Outcomes*

The outcomes of the project will be:

- empirical results concerning promising scenarios and user requirements for memory matching systems;
- an analysis of the design space of interfaces for memory matchers that is based in part on user studies;
- an analysis of the design space of representations and algorithms for memory matching that is based on experience with some instantiations;
- a working prototype of a memory matching system that has been subjected to both iterative and summative user testing;
- a detailed report on the results of the evaluation of this prototype, in which both positive and negative results are explained;
- publications that make these results available to the relevant research communities.

#### *Detailed Description*

[The detailed description that was included in the original proposal has been omitted here because of the space limitation.]

### **SUPPORTING INFORMATION**

#### **Related Work**

The proposed work on the CONVERSATIONPIECE can build on several lines of recent research—each of which contributes some valuable ideas and techniques but none of which addresses all of the issues that arise with the CONVERSATIONPIECE.

#### *Related Work of Others*

##### *Personal Memories*

The creation of personal memories in instrumented environments for the purpose of extending the user's perception and recall has been studied for more than 10 years (see, e.g., [14]; [6]). While this research has focused on user interface design for the retrieval of memories, other research has looked into ways of processing the contents of such memories so as to increase their accessibility to their owner (see, e.g., [7]; [5]). Both types of approach can yield ideas about ways in which one person's artificial memory might be compared with that of another person.

##### *Sharing of Experiences*

One popular application of modern information technology has involved the creation of new forms of communication between people, ranging from SMSs and cell phone photographs to online forums, blogs, and more futuristic ways of keeping in touch. But the mere existence of a communication channel does not ensure that the ensuing communication rises above the level depicted in the beer commercial "Watchin' the game, havin' a Bud". One general approach to enhancing the value of communication is to help users to find messages that are of special interest or relevance to them. Some work (see, e.g., <http://www.feedmap.net/>) has accordingly addressed ways of indexing and otherwise processing experience-sharing messages so as to enable targeted access. In relatively complex ways, in the project LIVING MEMORY ([17]), records of people's activities and access to community-related information are automatically processed in support of community-related behavior.

##### *Social Matching*

A broad class of systems partly resembles the CONVERSATIONPIECE in that they bring people together on the basis of factors like common interests or complementary expertise. These *social matching* systems (see [20], for a review) differ from the CONVERSATIONPIECE in that they focus on bringing people together in the first place more than on facilitating communication between them once they have gotten together. But there is some attention to the latter process as well, which is referred to by [20] as the art of "making a good introduction": The same information that caused the system to match two individuals in the first place can be presented to them in some form so as to facilitate their communication. Probably the most advanced

example is offered by the system AGENTSALON (see, e.g., [18]): When this system has determined that two participants in a conference have attended the same presentation, it attempts to stimulate a conversation via rather extreme means, involving animated characters. Given the reluctance that people generally show to interacting regularly with animated agents, the CONVERSATIONPIECE project will look for more lightweight, unobtrusive ways of facilitating communication, which fit smoothly into everyday life.

#### *Other Relevant Research*

Other lines of partially relevant research include research on group recommender systems ([11]), social navigation (see, e.g., [19]), technology that supports casual or intimate relationships (see, e.g., [22], and [21], respectively); and—with regard to the specific domain envisaged for the first CONVERSATIONPIECE prototype—personalized access to news and entertainment (see, e.g., [3]).

#### *Directly Related Work of the ConversationPiece Contributors* *Specter*

The contributors to the proposed CONVERSATIONPIECE project have acquired considerable experience with systems that build up and exploit personal memories within intelligent environments. The project SPECTER (2003–2005), funded by the German Ministry for Education and Research, addresses the recording and exploitation of user actions captured in an intelligent environment. SPECTER acquires information about the user's context and actions from various sensors and from applications that the user interacts with (including web browsers and SPECTER itself). The *personal journal* acquired in this way can be inspected and modified by the user in an introspection process ([13]; [2]). The personal journal also serves as a source of guidance to the user when she is performing tasks in an intelligent environment, such as an instrumented store. For example, when the user examines a particular product in the store, SPECTER can remind her of past experiences that she has had with the same or similar products. The results of an evaluation of the use of SPECTER in a shopping scenario are presented in [15].

#### *SharedLife*

Whereas SPECTER focuses on the use of an artificial personal memory by a single user, its successor project SHARED LIFE (2006–2008) explores ways in which people can benefit from access to each other's memories. The emphasis in this project is on learning directly from the memories of others—for example, acquiring information that is helpful for the performance of a particular task, such as shopping or traveling. Hence, the functionality of SHARED LIFE could actually lead to an (undesired) reduction in direct human-human communication. We therefore see the type of scenario addressed in the CONVERSATIONPIECE project as an important complement to the scenarios considered in SHARED LIFE: Although they make use of much the same infrastructure and internal processing, they may involve distinctly different forms of human behavior. An example of an issue common to the two projects is that of how users can conveniently but effectively control access by different persons to different parts of their memories. A

recent discussion of work in SHARED LIFE was presented in [1].

#### **Qualifications of the Principal Investigator**

Anthony Jameson (who will participate in the SHARED ENCOUNTERS workshop at CHI 2007) is a principal researcher at DFKI and adjunct professor for human-computer interaction at the International University in Germany. In more than 20 years of research on intelligent user interfaces, he has been one of the earliest researchers in areas such as user modeling in natural language dialog systems, utility-based product recommendation, probabilistic user modeling, assessing the effects of contextual influences on users, and recommendation via decision-theoretic planning. Recent activities that are related to the CONVERSATIONPIECE proposal include: principal investigator in one of the two teams in the multinational Vulcan-sponsored project HALO 2 (<http://www.projecthalo.com/>); design and analysis of evaluations for the DFKI project SPECTER; (co-)author of several relevant international publications (including [4]; [9]; [11]; and [15]); coeditor of a relevant journal special issue ([10]); invited speaker ([8]) and program cochair ([16]), respectively, for relevant international conferences; and presenter of relevant tutorials at the conferences AH 2006, IUI 2007, and CHI 2007. Maintaining contact with industrial product development, Jameson also conducts practically oriented usability studies, such as recent comparative evaluations of a total of 75 deployed spoken dialog systems (see, e.g., [12]). Further information and publications are available via the homepage <http://dfki.de/jameson>, and a complete CV can be downloaded from <http://dfki.de/jameson/cv/cv-jameson.pdf>.

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