

# Adding Convenience to “Cohabitation of Convenience”

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**Abstract.** The home environment offers a promising venue for deployment of pervasive technologies. To date, most research efforts in this domain have focused on improving the life experience of family members. However, nowadays many people who are unrelated to each other share accommodation, giving rise to the phenomenon of “cohabitation of convenience”. Examples include elder care facilities, hostels, shared houses and dorm rooms. We provide a scenario-based exploratory study into how pervasive technologies can be used to access and disseminate personal information while amongst unrelated residents. We further plan to develop and evaluate systems that accomplish the proposed scenarios.

**Keywords:** Smart home, ambient display, mobile computing, domestic computing.

## 1 Introduction

Back in 1972, Stanley Milgram identified the phenomenon of *familiar strangers* in urban public places [8]. Familiar strangers are the people whom one comes across frequently but interact with them rarely, such as commuters at bus stops or subway stations. Drawing on Milgram’s notion of familiar strangers [8], Paulos and Goodman [10] explored how mobile devices are likely to impact the relationships among urban strangers. Nowadays, strangers are no longer confined to public places but have penetrated domestic venues as well. Mobility and economic considerations of modern life have made it common for unrelated people to live in shared households [7]. In addition to short-term residences (hostels, hotels, elder care facilities etc.), there is also a trend to change long-term residences regularly to avail of new job or education opportunities elsewhere [12].

Even when people live for a substantial period at a place, they share it with other people who are not their friends or family members. Among the co-residents, there may be some students, and others professionals. Some residents work/study part-time, others full time. Some work in night shifts, while others during a morning shift. Socio-economic considerations of residents make them share their residence with people who have remarkably different professions, hobbies, daily schedules, personal preferences, life-styles, and cultural backgrounds. This is the arrangement we term as “*cohabitation of convenience*”.

A bulk of research activities in the smart home domain has focused on supporting life for family members. These include ethnographic studies [2] as well as “peace of mind” applications such as Digital Family Portraits [9], CareNet [4], and the Whereabout Clocks [1]. To our knowledge, no ethnographic study as yet has investigated the implications and prospects of pervasive technologies use in cohabitation of convenience. Without concerted efforts to understand and address these requirements, the research community runs the risk of rendering domestic pervasive technologies irrelevant to a significant section of the population.

In this paper, we present an exploratory study into how pervasive technologies can help add a degree of convenience to the lives of unrelated co-residents. We presented some scenarios to a group of unrelated house-mates about the exchange of personal information between their personal devices and an ambient display. Our future plan is to use a scenario-based approach [3] for the design and *in-situ* evaluation of the pervasive system that can realize these scenarios.

## **2 Pervasive Technology Usage Scenarios in Cohabitation of Convenience**

To determine the requirements of pervasive systems that support cohabitation of convenience, we conducted a study into the daily lives of 12 people living in 4 different shared accommodations in Dublin, Ireland. The study involved a visit to the selected shared accommodations and a focus group discussion with residents that typically lasted for about 2 hours. We adopted a scenario-based approach to discuss our concept. Scenarios provide a comprehensive overview of the functionality, interaction and contextual settings of system, from both user and designer perspectives [3]. The participants were in the age group 19-35, eight of them males and four females. All of them were adept users of ICT (Information and Communication Technologies) including cell phones, personal digital assistants (PDA) and computers. Ten of them were computer professionals and had good insight into the implications of pervasive computing and smart home technologies. The participants received a pizza lunch as a gratuity.

We noticed that while our participants lived in single bedrooms, they shared not only the kitchen, bathroom and living rooms, but also the collective responsibility for maintenance and cleanliness of these shared spaces in their respective houses. The scenarios we envisaged include the presence of an ambient display in the shared space of the house that serves as medium to exchange information with personal digital devices of the residents. Personal digital devices include cell phones, personal digital assistants (PDAs), notepads or personal computers. We draw on the scenario of use of a SharedNotes system [6] that supports exchange of information between PDAs and a shared public display, though in a different setting (workplace). To assuage privacy concerns, contents of the ambient display must be visible only to the residents and the landlord. To achieve this, the contents need to be represented in the form of a graphic visualization that is aesthetically pleasing and understandable only to the particular resident [5, 11].

Below is the description of scenarios we presented to our study participants in order to get their feedback.

### **Scenario 1: Notification of Bills**

In the last week of each month, the ambient display shows notification of due bills by the tenants. After the system gets confirmation of a particular tenant's payment to the landlord's bank account has been accomplished, it subsequently removes the tenant's notification from the ambient display and sends a receipt notification to their personal digital device. Tenants can select which personal digital device (cell phone, PDA or personal computer) they want to receive the receipt of bill payment on.

### **Scenario 2: Cleaning/maintenance schedule of shared spaces**

The ambient display posts information about which tenants are scheduled to clean the shared spaces (kitchen, bathroom, living room etc.) of the house on each weekend. As a reminder, the relevant person is sent a notification on his/her personal device at an appropriate time. If due to some urgency, tenants cannot clean the shared spaces on their turn, they may use their personal devices to post a request on the ambient display for a change in schedule.

### **Scenario 3: Personal Plans**

Residents can use their personal devices to post information on the ambient display about their personal plans including exams, holidays, parties, visits of close ones, or health details (cold/flu etc.). This is to ensure that co-residents get to know in time about changes that may affect them for a short time and avoid any trouble arising because of their conflicting schedules.

### **Scenario 4: Leaving residence**

Tenants can post a notice of their departure on the ambient display at an appropriate time as regards the terms of contract, so that the landlord and other tenants brace themselves to have a new tenant. The landlord pays the deposit back to the departing tenant, a receipt is sent on the latter's personal device and his/her personal profile is deleted from the system.

### **Feedback from participants**

Initial responses from residents have been quite supportive of our ideas. Most of them appreciated the idea of presenting relevant information on ambient display in an aesthetic form and use of personal devices for communication and coordination among fellow residents. However, some expressed the concern that co-residents, being there for a while, may be able to decipher the "hidden" messages on an ambient display. At present, we are in the requirement analysis phase of system design. Importantly the participants of our interviews are not representative of the general population living in shared houses. We plan to conduct an ethnographic study about the prospects and potentials of pervasive technology use in cohabitation of convenience and draw on the results for design and *in situ* evaluation of that system.

### 3 Conclusions & Future Works

In this paper, we investigated some ways pervasive computing technologies can be used to support an improved level of convenience for unrelated people living under the same roof (so-called “co-habitation of convenience”). We used a scenario-based approach to help a group of residents understand the potential use of pervasive technology in their domestic settings. The scenarios were focused on sharing information between an ambient display in a shared space of the house and personal digital devices of the home residents. We plan to conduct the scenario-based interviews with a larger sample of people to predict the acceptability of our proposed scenarios. Based on the results of these interviews, we will propose design guidelines for pervasive systems that support convenient living. The next step will be to develop that system and deploy it in homes for in-situ evaluation over a substantial period of time. We will also investigate how deployment of pervasive technologies strengthens the sense of belonging among residents and in turn influences the very nature of cohabitation of convenience.

While we have focussed on a very limited range of pervasive applications, namely ambient displays and personal digital devices, this is not the full range of opportunities from the study of co-habitation of convenience. We envisage scenarios where audio sensors, appliance use sensors, activity detection mechanisms could also be used to develop applications for improved awareness of the use of shared spaces.

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