# Sharing Memories: "The UbiComp Scrapbook"

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**ABSTRACT**
This demonstration presents our Virtual Personal Server Space (VPSS) to support applications for enhancing the sense of purpose and social wellbeing of the elderly, by promoting reminiscence and communication activities. We present our digital scrapbook application for memory sharing, and multimodal email application including our novel pen and paper based "*drawable"* user interface. Over the course of its use this demonstration produces a physical scrapbook with a corresponding digital scrapbook augmented with images and sounds from our multi-modal, multi-device ubiquitous computing system.

**Keywords**
Multimodal interface, personal area networking, context-awareness.

**INTRODUCTION**

Research in gerontology has identified the need to support the social fitness and sense of purpose in the aging community, beyond just their needs in health and physical fitness [2]. Aged care research has shown that engagement in *reminiscence* activities can be a key factor in stimulating the social health and ongoing sense of wellbeing of elders.

Our research, entitled "*Project Nightingale*", aims to enhance the social fitness of elders by developing technologies that support and promote reminiscence activities [4]. To achieve the level of natural interaction identified through our early user studies, we target our research at the non-desktop computing environment.

While the computing environments we envisage are not in evidence today we base our approach on the realisation that people are increasingly carrying small computing devices that are capable of interacting with ubiquitous computing environments in a personal, local and remote manner [1,3,7]. In Nightingale we view the varying network topologies in terms of personal area networks (PANs), personal local area networks (PLANs) and personal wide area networks (PWANs). Often the PAN consists of devices that have no classical user interface but some limited computational power, storage capabilities and different class of network connectivity. Such devices range from a simple ID, wireless drive, USB key, mobile phone, PDA and up to systems such as the Intel Personal Server [7]. In Nightingale, these devices are coordinated to allow an individual to use, in a context-aware manner, the information and applications they carry or can access.

We aim to support natural interaction with the computing infrastructure through *invisible* and *adaptive* interfaces. We have developed a multi-modal computing model that supports speech, gesture, pen, and keyboard input modalities. Along with the use of haptic, sound, text-to-speech, and shared-display output modalities. The multi-model (application plane) is under pinned by an inference-based context repository (context plane) and a mobile data management system (data plane). Through the multi-modal computing model each application can access the devices both that a user carries, and that are available to her in the surrounding infrastructure [4].

In this paper we describe a motivating scenario to demonstrate our work based on an elderly user using a paper based interface to communicate with her friends or family, and engage in reminiscence and memory sharing activities through a digital scrapbook [5]. We further describe realization of our scrap book application, and pen/paper based user interface for a multimodal email application.

**Motivating Scenario**

We consider the situation of an elderly person living alone. She maintains regular contact with her family though email, instant messaging and telephone. As they live some distance away, they make personal visits to her several times a year. She attends a social group for elderly people once a week. At this group they regularly engage in reminiscence activities. She likes to keep in contact with her friends from the group via email and telephone during the week. As a hobby she maintains a number of physical scrapbooks containing photos, writing and other physical items.

On a typical day, while having her breakfast, she decides to listen to her new messages. She is wearing a watch that is sensitive to certain gestures. She makes a gesture indicating she wishes to check her email. Her VPSS in her

house determines using her previously indicated preferences and the devices in her vicinity that her nearby radio is the most suitable device for reading her email: it tells her how many emails she has waiting for her. She performs another gesture to indicate the next new message should be read to her.

It is Saturday, so she prepares herself for her social group later that afternoon. She spends some time adding a number of new pages to her scrapbook, adding both handwritten notes, photos, clippings and audio notes. She leaves her physical scrapbook behind but carries her personal server on the train, where she continues to listen too and write new messages to her friends and family. Once with her social group, she can access the scrapbook or other personal content through the interface elements in the community center. She also has the option of publishing her scrapbook pages, or section thereof, to her family website (without accessing any home PC).

### Pen and Paper interface

Our current pen and paper interface is based on the microdot recognition system from Anoto. This technology is primarily focused on the preprinted forms market to simplify data entry. Our use of this system isn't tied to any preprinted form. Instead, the data and markers that the user writes on the paper are interpreted by the user's personal server [7] and once parsed, are passed to the appropriate application. Instead of relying on pre-printed forms, our approach is to allow each individual to draw their own interface, adding required interfaces elements when and where required. Our email demonstrator allows the individual to draw their address list, folder hierarchy, commands and email messages, all on the same page.

Our context plane allows the page to act as an interface to a number of applications rather than a single application as in the pre-printed form model. The data plane stores the underlying stroke data, which is then used by a number of data managers for permanent storage in each person's home server or in a local store for temporary application data. The data managers coordinate as the network topology changes to achieve a hierarchical data caching mechanism.

### Scrapbook Application

Our scrapbook demonstrator was inspired by the qualitative data collected in our early user studies [5], where the creation of a physical scrapbook or photo album is a significant source of reminiscing opportunities. This application uses the paper in a natural manner to enter data, actions and physical images onto the page. Here the digital representation is produced as a by-product of the physical interaction.

The video recognition system in the surrounding environment allows us to produce a digital copy of physical information, entered into the scrapbook. In addition to pasting physical images into the scrapbook, they will be able to add in digital items, from a flash card in their digital camera for example. By drawing a box and labeling it "pic", they will be prompted to select a digital image to insert from a collection of images shown on a nearby screen (e.g. laptop or PDA).

The image selection screen and pointing device is selected seamlessly via the VPSS. To view the digital picture in future, an individual simply ticks the box drawn with the Anoto pen: the picture will be displayed on a nearby screen selected through the VPSS.

All digital items added to the scrapbook (including audio annotations, digital pictures, and the digital representation of the physical pen strokes) can be automatically published on a website, the digital version of the scrapbook. Audio annotations and digital pictures can be accessed by clicking on the digital image of the drawn boxes, which will appear as a hyperlink. In order to show physical pictures pasted into the scrapbook on the website, the digital and physical representations will have to be synchronized. To achieve this, the scrapbook is periodically placed under the gaze of a fixed high-resolution digital camera. Template matching algorithms are used to extract an image of the physical items, and they are published on the website

### Future work and Acknowledgements

Our future work involves studies with the user group from our early cultural probe study along with evaluation of both of context and data planes. The authors would like to acknowledge the ongoing support of the Smart Internet Technology CRC Australia and the National ICT Australia.

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