SoloFind: Chains of Interactions with a Mobile Retail Experience System

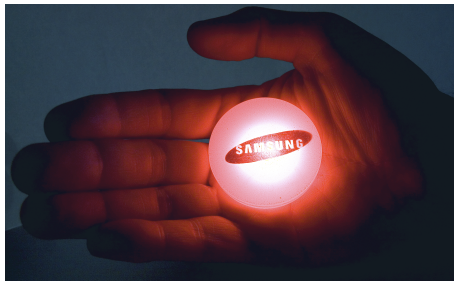

Figure 1. The physical interface from *Solofind* as experience prototype, equipped with a hi-power light emitting (LED) diode and a Near Field Communication (NFC) tag.

Alexander Wiethoff
University of Munich (LMU)
Munich, Germany
alexander.wiethoff@ifi.lmu.de

Gregor Broll
DOCOMO Euro-Labs
Munich, Germany
broll@docomolab-euro.com

CHI 2011, May 7–12, 2011, Vancouver, BC, Canada.
ACM 978-1-4503-0268-5/11/05.

Abstract
This paper presents *SoloFind*, a mobile retail experience system for large consumer electronic stores that helps users to retrieve product information. A tangible user interface (TUI) allows customers to collect product information via a simple, Near Field Communication (NFC) based interaction. This data can be customized, reviewed and compared at an interactive kiosk. The simple, touch-like interaction with NFC provides a seamless user experience for customers. This paper focuses on the design of *SoloFind*, its features and their preliminary evaluation with an experience prototype.

Keywords
Tangible User Interface, Near Field Communication, Retail Experience, Interaction Design, User Experience

ACM Classification Keywords
H.5.2 [Information Interfaces and Presentation]: User Interfaces – haptic i/o, input devices and strategies, interaction styles, prototyping, user-centered design

General Terms
Design

Introduction
Retail stores for consumer electronics often display a large portfolio of branded products that are spread all

over the floor area. The mass of products can seem overwhelming, making it increasingly difficult to gain an overview of interesting items and to gather information about them. Customers may look for products of a particular brand that are compatible with each other or have complementary features, e.g. compatible audio and video sets, docking stations or devices that are connected by wireless technology. In addition, customers with little or no technical knowledge often find it hard to get assistance in such stores. In order to raise brand awareness, to connect products from a company's portfolio and to provide product information to (inexperienced) customers, we have developed *SoloFind*. This implementation has been designed as a simple and intuitive retail experience system rather than a shopping assistant. Customers can scan a store for interesting products and collect information from them using a Near Field Communication (NFC)-enabled tangible user interface (TUI), called *Token* (see Figure 1). Customers can bring the *Token* to an interactive kiosk where they can review and customize the collected information according to personal needs and preferences (see Figure 2). *SoloFind* uses NFC to facilitate the interaction with products and to establish a relationship with customers, supporting a higher feeling of ownership. *SoloFind* can help to create "chains of interactions" with products and can be easily integrated with the existing infrastructure of individual stores.

After an overview of NFC in retail systems, this paper focuses on the design of *SoloFind* as a retail experience system and explains the user centered development process which includes a preliminary evaluation of the concept with an experience prototype.

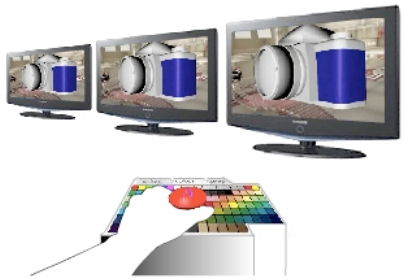

Figure 2. Mockup of *SoloFind* : Customers can use the TUI at the interactive kiosk to get more information about collected products or to change their properties, e.g. available colors

RELATED WORK

NFC is a wireless technology for exchanging data over short distances, similar to RFID (Radio Frequency Identification) but targeted at mobile devices. Both technologies can store data on passive tags that can be attached to arbitrary objects. Users can retrieve data from a tag by touching it with a reading device, e.g. a mobile phone, or by holding them closely together [11]. An increasing number of applications use this simple, touch-like interaction between mobile devices, readers, tags and smartcards to facilitate information retrieval, ticketing, payment or the interaction with tagged objects and associated services [1].

In retail ecosystems, RFID is already used in the supply chain, e.g. to identify and monitor products, to manage the inventory and to facilitate its replenishment. Companies like the Metro Group are also starting to use RFID on the customer level, e.g. to retrieve information about products, to check their availability or to recommend combinations with other products. Other

applications are smart shopping carts, self-checkout systems or automated payment [5]. Other approaches use the interaction with NFC- or RFID-tagged products to exonerate the staff and to provide additional services to customers [9]. Nepper et al. [6] use the interaction with tagged products like CDs, DVDs or books to provide previews on mobile devices. APriori [8] is a mobile application for creating and retrieving recommendations for tagged products on-site. In a survey among European retailers about the adoption of different NFC-based services, Wiechert et al. [12] conclude that NFC could accelerate the checkout and payment process and make the shopping experience more convenient for customers.

DESIGN PROCESS

In order to create the design for the *SoloFind* system, we followed a user-centered design process [10] and developed an experience prototype. At the beginning of this process, we conducted 20 informal interviews with 15 customers and 5 service employees in large electronic retail stores, gaining a better understanding of the context and the relevant design needs. We focused on customers who were not very familiar with either technology per se or with new electronic products and who were therefore likely to demand a high level of attention from store personnel.

In summary, two main issues were reported by 12 of the interviewed customers: First, most of them felt a lack of information when browsing electronic products. For example a 45-year-old woman who was inexperienced with electronic products and who wanted to buy a digital camera suggested that information could be provided by short demo movies. Second, some customers claimed that trying out products by themselves was difficult due to their own lack of technical knowledge and because store personnel were often not available to provide assistance. This perception was confirmed by store personnel themselves who said that there was not enough time to explain products in detail. Four of them claimed that their other tasks consumed much of the time which would be normally dedicated to customers.

Based on these findings, we created and discussed various scenarios, identified the best ideas and finally designed the *SoloFind*-system. Experience prototyping [1] and body-storming [7], a design technique where team members *act out* a concept to gain more insights, were applied in the later process phases, to develop the concept further. Due to the fact that this was an explorative design study, we regarded the experience prototype described below as a proof-of-concept to promote the idea to other potential users.

SYSTEM OVERVIEW

The experience prototype consists of five components that can be seamlessly integrated into the existing facilities of consumer electronics stores. To start the experience, customers collect the physical *Token* from a dispenser in the entrance area of the store. When passing closely by products of a promoted brand, the *Token* is activated and gives ambient light feedback. When customers are interested in a product, they can collect information about it by touching a marked *Landing Zone* next to it with the Token. This interaction uses NFC to transfer product information from the *Landing Zone* to the *Token*. Later, the collected information can be retrieved from the *Token* in order to use it at an interactive kiosk. There, customers can view the collected data, watch animated movies about

the products, add features, customize them and preview the modifications on a large display.

Dispenser
The first *touch point* of the retail experience is a dispenser where the physical *Token* can be picked up. The dispenser is located in a prominent location of the store, preferably near the entrance, where it acts as an eye-catcher and explains the system to customers. A map on the front panel of the dispenser gives a brief overview of the products of a particular brand that are spread throughout a store.

Token
The design of the physical *Token* was inspired by ambient movable objects, e.g. by Heaton et al. [4]. During performances with LED Throwies [3] from the Graffiti Research Lab, many of the physical objects (big LEDs in various colors with a battery and a magnet that adhered to any metal surface, e.g. a tram or facade) were collected by the audience and later served as an ambient experience reminder at home. These examples inspired us to identify the main strategy for our concept and to use simple objects. The *Token* (see Figure 1) provides functionality on four levels: Firstly as a desirable object with gentle haptic qualities, secondly as a container that can store digital information for later use and thirdly as a tangible UI that helps users to customize collected product information at an interactive kiosk, e.g. by changing colors or by adding features. Finally, the *Token* serves as a reminder of the retail experience that can be connected to the private PCs of customers via Bluetooth to let them review the collected product information at home.

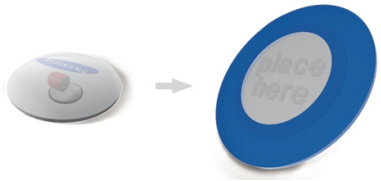

Figure 3. The *Token* (left) and the *Landing Zone* (right) can exchange product information via NFC

Landing Zone
This component (see Figure 3, right) is ideally located next to each product from the same brand in a store. The *Landing Zone* arouses more attention and provides more functionalities than a simple tag on a product: It is able to activate *Tokens* from a certain distance by triggering ambient light feedback and thus making customers aware of nearby products. If customers are interested in a product, they can collect information about it by touching the *Landing Zone* with the *Token*. Through this simple, NFC-based interaction, product information, such as video clips or technical details, can be collected and stored on the *Token*. After a successful information transfer, the *Landing Zone* and the *Token* give feedback by blinking twice synchronously.

Broadcasting Unit
After product information has been collected with the physical *Token*, the customer can use it as a TUI at an interactive kiosk, the *Broadcasting Unit* (see Figure 4), which is ideally located at prominent areas in the store that customers have to pass by, e.g. the register. The interactive kiosk has a digital surface and is connected to a large display, becoming the next touch point in the interaction chain within the system. Once the *Token* is

placed on the surface of the kiosk, the product information is transferred and presented on the large screen, e.g. as an animated movie. Customers have the opportunity to view product details, receive ratings, customize the virtual pendant, e.g. by playing with the color palette (see Figure 2), or finally buy the customized product or additional add-ons.

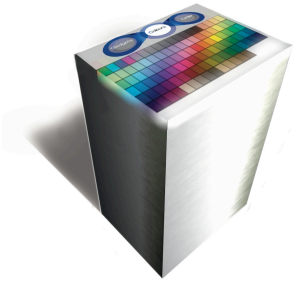

Figure 4. The *Broadcasting Unit* lets users interact with the collected product information playfully by triggering animated 3-D movies on a nearby display

Virtual Store

After customers have left the store they can keep the *Token* which serves as a physical reminder of the retail experience, a container for product information and as a physical key to the virtual brand store. Customers can transfer product information from the *Token* to their private PCs, e.g. via Bluetooth[1], in order to review them again. The *Token* can also contain information to grant access to an online store for a promoted brand which provides the same or even more options as the *Broadcasting Unit*.

[1] http://www.bluetooth.com/

EXPERIENCE PROTOTYPE

The experience prototype was set up in a *Wizard of Oz* style, so that only limited functionality was available and that prompting was required to interact with the system. We installed an NFC reader which was capable of reading one NFC-tag at a time underneath a mockup of an interactive surface. The physical *Token* was equipped with an NFC-tag and an ultra-bright LED that flashed when squeezed (see Figure 1). Once the *Token* was placed on the surface, it would trigger a 3D-movie of a digital camera in various colors (see Figure 2). We have instrumented an exhibition space of three by three meters with the experience prototype to emulate a sale area from a retail store. A 60” HD display was mounted on one wall and served as a public display.

Study Setup

In order to get feedback on the features and the usability of the experience prototype, we conducted an informal observational study with 50 subjects (age 35 to 45) at a public design exhibition. 35 of them claimed to be inexperienced with new technology. First, the subjects were briefed on the general concept of the system, followed by a walkthrough where each step of the interaction was explained. Afterwards, the subjects had to carry out one part of the interaction, namely triggering the 3D movie with the physical *Token*. Since the prototype was not fully implemented and did not yet support all possible interactions, this preliminary study was rather informal. During the study, we focused on qualitative anecdotes from the subjects as they interacted with the prototype.

Observations

We received mostly positive feedback about whether the subjects would use the presented system. Some of

them appreciated the easy product customization and the simple interaction without a graphical user interface (GUI). Others noted that an easy, seamless interaction such as NFC would be appropriate for a retail context where time and changing user groups are an obvious issue. For example: "I think this system could assist me and I would appreciate trying it in a real context.", was a memorable quote from one user. However some users stated that an immediate, in situ product comparison was not possible. This concern raised interesting questions for a further setup and will be addressed in future work.

DISCUSSION AND FUTURE WORK

Considering the increase of retail products and the decrease of in-store assistance, customers can benefit from applications like *SoloFind*, allowing them to collect, compare and customize product information in a playful and individual way without the need of additional equipment, such as smart-phones. In this paper, we have focused on the user centered design of *SoloFind* as a retail experience system. Its preliminary evaluation with an experience prototype indicated that the concept is promising for future explorations, starting with the implementation and more substantial evaluation of the presented system. Future work on *SoloFind* could also combine the existing concept with other technologies, e.g. smaller broadcasting units near products providing immediate information at the point of sale, or extend it to other use cases, where novice users have to handle an increasing number of information in an intuitive way.

References

[1] Broll, G., Rukzio, E., Paolucci M., Wagner, M., Schmidt, A., and Hussmann, H. 2009. Perci: Pervasive Service Interaction with the Internet of Things. In IEEE Internet Computing 11/12 2009, IEEE Computer Society, 2009, 74 – 81.

[2] Buchenau, M, Suri, JF. 2000: Experience prototyping. In Proc. Designing Interactive Systems (DIS´00).

[3] Graffiti Research Lab: Throwies. http://graffitiresearchlab.com/projects/led-throwies/ (last access: December 28, 2010)

[4] Heaton, K. B., Poor, R. D., and Wheeler, A. J. 1999. Nami. In Proc. EA SIGGRAPH99, ACM Press.

[5] Metro Group Future Store Initiative website. www.future-store.org/fsi-internet (last access: December 20, 2010)

[6] Nepper, P., Konrad, N., and Sandner, U. 2007. Talking Media. In Proc. MobileHCI '07, vol. 309. ACM, New York, NY, 348-350.

[7] Oulasvirta, A., Kurvinen, E. 2003.Case studies in bodystorming Springer London, ISSN:1617-4909,

[8] Reischach, F. von, Guinard, D., Michahelles, F., and Fleisch, E. 2009. A mobile product recommendation system interacting with tagged products. In Proc. PerCom´09.

[9] Resatsch, F., Karpischek, S., Sandner, U., and Hamacher, S. 2007. Mobile sales assistant: NFC for retailers. In Proc. MobileHCI '07, vol. 309. ACM, New York, NY, 313-316.

[10] Saffer, D. 2006. Designing for interaction. ISBN 13: 978-0-321-64339-1 New Riders.

[11] Want, R. An Introduction to RFID Technology. IEEE Pervasive Computing 5, 2006.s1 (Jan. 2006), 25.

[12] Wiechert, T., Thiesse, F., Schaller, A., and Fleisch, E. 2009. NFC based Service Innovation in Retail: An explorative Study. In Proc. ECIS´09, Verona, Italy, S. 12.