

# Digitally Augmented Collectibles

Matthias Lampe<sup>1</sup>, Christian Metzger<sup>2</sup>, Elgar Fleisch<sup>2</sup>, Oliver Zweifel<sup>1</sup>

Institute for Pervasive Computing<sup>1</sup>  
ETH Zurich, Switzerland  
lampe@inf.ethz.ch, zweifelo@student.ethz.ch

Information Management<sup>2</sup>  
ETH Zurich, Switzerland  
{cmetzger, efleisch}@ethz.ch

## ABSTRACT

The Digitally Augmented Collectibles system extends the functionality of collector's items beyond simple exhibition and incorporates unobtrusively into a user's environment. It offers a simple interface to access item-specific information and establishes an emotional bond by playing item-related multimedia. The system identifies items through RFID and senses different combinations of collectibles. Digitally Augmented Collectibles is not limited to home-user applications but suggests potential to serve as a marketing tool.

**Keywords:** Tangible Interface, RFID, ubiquitous computing, HCI

## INTRODUCTION

One of the reasons we collect "things" are the memories they bring back and the warm feelings we have looking at them. Adding exclusive and item-specific multimedia to the collectibles intends to leverage distinctive emotional effects experienced by collectors when exhibiting their items [1]. However, emphasis has to be put on incorporating a digital augmenting system into already present objects to achieve high imperceptibility by still offering a simple interface [3][4][5][6].

In this demonstration, we showcase emotionally enhanced collectibles by adding item-related videos, pictures, and sounds. To allow distinct identification of all collectibles, we equipped our items with radio frequency identification (RFID) tags [7]. The collectibles are exhibited in various and alternating combinations, and many collectors use a stage as exhibition platform. This allows for indiscernible and complete integration of the computational technology into already present objects and prevents from introducing new elements. Additionally, we explore a user's interaction with the digitally augmented figurines and propose a business application.

The following sections guide through the interaction process with the system and show potential applications.



Figure 1: System—Display and Exhibition Platform

## SYSTEM

The system consists of a display and an exhibition platform for the collectibles [Figure 1]. Each collectible contains a passive high frequency RFID tag of 0.5"x1" in size (13.56MHz, ISO15693). This tag is attached to the figure's socket and invisible to the observer. The RFID reader's antenna is molded into the stage allowing for close proximity to the collectibles exhibited. This antenna powers the tag through magnetic induction and in return, the tag modulates the magnetic field to transmit its identification number. We built the antenna, which consists of one single rectangular loop (7"x3", 1/8" path width), on a printed circuit board. A few additional components are used to tune the circuit to the resonant frequency and to match the antenna's impedance to the one of the FEIG PR100 RFID reader. The reader forwards the collected data through USB to a Sony Vaio U-71 pocket PC where it is processed and displayed. Both, the reader and the pocket PC are embedded in a picture frame to make the hardware unobtrusive. Our .Net-based application software is built on top of our hardware abstraction layer, the RFIDStack [2]. The application connects the identification numbers of all exhibited collectibles with their distinct sets of characterization (i.e. terms describing a collectible). Then, it generates the intersection between the collectible's characterization sets and the sets of characterization for all multimedia files to create the most suitable play list.

Additionally, the system provides further information on a specific item on request. This information is accessed through the pocket PC's touch-sensitive display which allows for simple user-system interaction not requiring additional input devices.

For the applications presented below, we assume that the characterization sets, additional information, and the multimedia of the collectibles are provided by a third party, for example, by the company that produces the collectibles.

### APPLICATIONS

For this demonstration, we use figurines from Swarovski, one of the world's largest jewelry manufacturer. The figurines are made of lead glass with dimensions of about 1"x1"x 2". The collectibles are chosen from several species available; and our collection contains a swan, a dragonfly, a butterfly, a seahorse, a zodiac dragon, and a zodiac horse.

The first application is designed to suit a home scenario where the framed display shows a static picture similar to a photo when no figurines are present. However, if one or more figurines are exhibited, the demonstrator comes alive and illustrates how digital information is used to leverage aesthetical pleasing and emotional engagement. For example, the exhibition of the zodiac dragon is accompanied with videos showing the Chinese Dragon Dance, pictures of the Chinese animal zodiac, and the Great Wall of China. Chinese music is added to all pictures and silent videos. Adding the zodiac horse extends the play list with videos and pictures of horses, and if the dragon is removed, all previous files but the dragon-specific videos and pictures remain in the play list. Items from the same product line form a homogeneous play list while the combination of figurines from different product lines leads to an interesting mixture of videos and pictures (e.g. when the butterfly or the seahorse is exhibited with the zodiac horse already on the stage).

The second application focuses on the integration of digital information-providing services at a point-of-sale. Any item in the store may be put on the stage to request information. The detection of each item is displayed by showing its picture and item-specific information is accessed by touch-selecting the picture [Figure 2]. Now, the features of the figurine are presented to the customer along with information on the designer. Additionally, one learns about the price, the article number and about other items one may be interested in. A browser to surf the manufacturer's webpage could easily be implemented.

The software offers an additional feature for both presented applications. It provides statistics on how long each item was on the stage. This information may be of significant interest to retailers and collectibles manufacturers to learn about customer behavior at home. Understanding what items are exhibited the most and what are the preferred combinations, allows adjusting a product line to suit the needs of the customers and to direct promotions.



Figure 2: Graphical Interface to Touch-Select Items

### FUTURE WORK

While Digitally Augmented Collectibles suggests potential to increase emotional bonding with collectibles by adding item-specific multimedia, a usability study should analyze the influences on the observer in more detail. This study would also determine intuitiveness and user satisfaction with respect to example tasks. In addition, when considering using this system as a marketing tool, privacy issues should be addressed that arise from collecting statistics and making user behavior transparent.

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