Interactivated Reading Table

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ABSTRACT
A mixed media reading table has been developed and presented to the public on various occasions. The aim is to create an integrated experience for the users, bringing together traditional media (such as books) with new media (such as video). The table uses RFID technology to link the physical objects to the media content. The project is submitted as a demo for the conference.

Keywords
Tangible User Interfaces, RFID tagging, public interaction

1. INTRODUCTION
The Interactivated Reading Table uses physical objects for people to interact with particular new media content such as videos, sounds and web sites. It combines the tangibility and clarity of printed media such as books, papers and articles with the malleability and flexibility of new media.

Books, magazines and journals often contain DVD's and CD's to support and expand the content. In order to access the content of such a disc, it has to be loaded in a computer or media player and therefore physically detached from the book. Another frequent disruption of the reading experience is caused by hyperlinks, which in order to be accessed need to be typed from the text on the paper into a web browser application on a computer (often leading to mistyping). These types of *mode switches* are disruptive for the user, having to switch back and forth between one mode of interaction and the other. In order to create a more coherent experience we have developed a system that allows easy access to preloaded new media content by tagging the actual physical objects which are on the reading table as shown in Figure 1. The multimedia content can be further manipulated (through functions such as Play/Pause, Fast Forward or Backwards) with interactivated objects.

Rather than following the computer industry's tendency and technology push to *replace* old media by new media, we aim to *merge* the strengths of traditional media with some of the specific qualities of new media.

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Figure 1. The Interactive Reading Table set up.

2. TECHNICAL DESCRIPTION
All the objects on the table are 'tagged' with one or more RFID (Radio Frequency IDentification) tags. Each tags contains a unique number and act as a passive transponder when brought in close proximity to the RFID reader. A Phidget RFID reader[1] is connected to a computer (Apple MacBook Pro) which runs a Max/MSP-Jitter[2] program or 'patch'. The patch links the object through its embedded RFID code to the appropriate media content and/or actions, displaying the content through a video-projector and sound system.

Tags are available in a variety of shapes and sizes, fitting most object shapes and sizes and materials (although metal object can interfere with the tags). The size of the tag (or actually the coil dimensions) determines the maximum reading distance. The typical reading range is 4 - 8 cm. Reading speed can be set in the software (through the Max object that works with the Phidget), and in this project set to 10 milliseconds. This is very important, as the confirmation feedback upon the user's action (eg. bringing the book over the reader) comes from the display of the content called up rather than a separate signal [1].

[1] see www.phidgets.com. It uses the EM4102 protocol, at a frequency of 125 kHz.

[2] see www.cycling74.com. Max is a visual object-based programming language, first developed for musical applications (and therefore very suited for real-time interactions) in early 90s, later extended with audio-processing objects (MSP) and real-time video processing (Jitter).

The Max/MSP-Jitter patch can play QuickTime videos in any format, audio files, switch to a web browser (and back again) or call up other applications.

3. EXPERIENCE AND AFFORDANCES

The focus of the user experience is a table and the physical objects on it. The computer, its interfaces and displays are not deliberately 'hidden', but de-emphasised by merging them in the surroundings. The RFID reader is mounted under the table surface, the computer is out of sight, the images are projected on the wall above the table, and the speakers are mounted near the ceiling above the projection. The audience is invited to pick up the books and items; activities of exploring, browsing, and reading can be seamlessly followed by multimedia content activated by the audience's activities (see Figure 2).

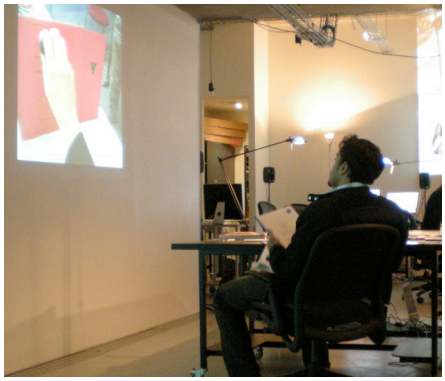

Figure 2. The Interactive Reading Table in use.

Earlier versions of the reading table were used to demonstrate artistic research projects, linking books, catalogues and magazines to videos of performances, documentaries, presentations etc. The current version was developed for the opening of Interactivation Studio at the design faculty at UTS, and showed mainly recent student design projects as well as some earlier research projects of the first author.

Figure 3, Earlier versions of the Reading Table

In the earlier versions of the Reading Table as shown in Figure 3, it was observed that it was often not clear how to use the table due to a lack of affordances. This became the focus of the current research phase, which led to the improvement of adding an icon for both the location of the reader and the location of the tag in the book as shown in Figure 4. First we added the icon only to some of the objects on the table, and it became clear that the affordance of these objects appeared clearer to the audience than the unlabelled objects.

4. CONCLUSION AND FUTURE WORK

The result of the Interactivated Reading Table is a mixed media experience. Through the table, traditional media such as books are extended with new media such as videos and web sites. Our university actively collaborates with a local design and science museum on other projects and this may act as a testing ground. This relates to the second author's PhD research on public interaction, for the context of museum exhibitions. During the last two years she has been working on academic design projects in Chile that use RFID technology to improve audience's experience in exhibition environments. These projects have explored the interactions between visitors and several elements involved in the different stages of the museum experience, such as introduction and exploration. Digital hosts and exhibits have been developed, showing the benefits of RFID technology for enhancing the interactions. The design results of these experiences are applied in the Interactivated Reading Table project. We also have experimented with the linking of other objects to media (see Figure 4). A technical artefact (in our case sensors) can call up a description and user manual dynamically explaining how the object works and how it can be applied.

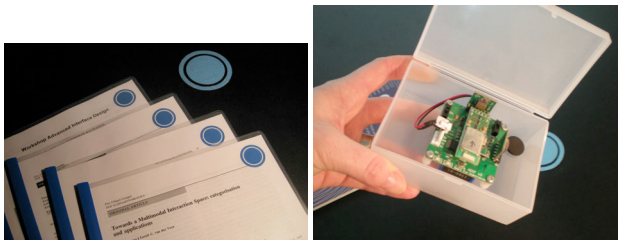

Figure 4. The icons for tagged objects and reader.

Other similar museum exhibits and applications such as Perry Hoberman's installation Bar Code Hotel and Philips Home Lab use of tokens have been studied [2].

After the first informal explorations with the working prototype developed as described in this paper, more research is now necessary in order to structurally improve the user experience. Further interaction techniques will be necessary for books or objects that have many potential linked media. At present we have tested a maximum of two videos, which is still clear to the audience. If there is more content other ways such as the interactivated objects may need to be applied. These objects contain commands such as Play/Pause, scroll, jump, select from a list, etc.

Another extension of the interaction we are experimenting with is the gesture of the object. Using multiple tags it is possible to detect the direction of the movement of the object over the reader, and potentially the speed, which can influence the delivery of the media content. We are also considering applying other sensing techniques in the interaction objects such as motion sensors, linking the orientation and movements of the object in finer detail to the parameters of the display of media content. As the interaction becomes more intricate, we will need to include feedback on user's action in other ways and modalities than just through the content.

5. REFERENCES

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