

ORIENT: Mixed reality with a tangible interface

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1 Introduction

The ORIENT (Overcoming Refugee Integration with Engaging Novel Technologies) application brings together engaging novel technology with rich narrative into a mixed reality game. The mixed reality aspects of the game are realised by way of a physical station. Users' can steer the course of the game using a mobile phone to scan the objects in the physical station and use a SMS (Short Message Service) style text input system. The software is designed to give users a novel and fun learning experience that will improve the users' friendship and integrations strategies: to go from "them and us" to "we". The fundamental mechanism used to elicit this process is intercultural empathy towards the virtual characters, which can then be transferred to the real world.

ORIENT is being developed through an iterative participatory design method, initially focusing on the exploration of the opportunities and the interaction design challenges presented by an RFID enabled mobile phone and a physical station used to interact with an application running on a cinema screen.

2 Overview of this paper

This paper will go on to discuss the use of physical stations as an interaction method in section 3, how we intend to use mobile phones and RFID tags in section 4, the content and story behind ORIENT itself in section 5, evaluation and testing in section 6 and finally summarise in section 7.

3 Physical Stations

It has been suggested that the separation of perception from action makes use of conventional interface methods less effective for use by children. Tangible user interfaces bring perception and action together in novel ways, which generally improve the learning experience. The implementation of tangible interfaces spans a wide range of applications each offering unique advantages, some focussing on spatial puzzles and problem solving, some focussing on imagery with cameras, some focussing on emotive interaction with biomorphic toys and so on. In all cases, children prefer these types of interfaces and are enthusiastic about the experience.

As mentioned, the interaction mechanism is via the physical station consisting of a selection of objects that map onto virtual objects, locations are activities. The mapping can be either logical or more abstract, thereby reinforcing the feeling of difference and equivalence between the users' world and the "alien" world. The objects are fitted with radio tags (RFID) containing information that is sent to the application. The users' can scan the objects with the phone, causing the application to respond appropriately, sometimes this is an interaction command; sometimes it contains a URL that launches a webpage. The game is designed for 4 users but only

one interacts at a time; the users have name badges that correspond to one of 4 roles, which the user can scan to “logon” to the game.

The game will be split between three real-world locations that each correspond to one of the three principal cultures, each with its own physical station. The users move to an entirely different physical location to interact with different cultures.

ORIENT is designed to be delivered via a number of audio-visual formats; indeed, the differing use of delivery methods is one of the aspects being evaluated. At the moment, ORIENT is being delivered via a cinema screen with the physical station in front.

4 Mobile Phones for Interaction

The ubiquity of mobile phones has led to a huge amount of research looking at interaction possibilities both in terms of ways of interacting with the phone and ways of using the phone as a mechanism to interact with something else [2,7]. Mixed reality games have also used communication systems like mobile phones to cross over into the real world, for example receiving SMS messages containing game data. Mobile phones are an obvious choice as an interaction mechanism given the target users existing affinity with them. Children born in the communication age are already adept at using communication channels that have a high level of abstraction from those they are interacting with. The flexibility of the phones in partnership with the RFID tags [3,5,6,8] give freedom to the design of the narrative itself and execution of the game. Users are also rewarded for completion of certain tasks. Artefacts are “unlocked” and given to the users, these can be then used later in the game. Rewards in the form of imagery, ring-tones or movies can also be given to the users [1,9] and are a very effective way of promoting engagement [1,9].

5 Orient

The Orient world contains 3 indigenous cultures and the “user” culture. Each of the three cultures is being designed to be entertaining and surreal, but most importantly, culturally coherent. The Cogs are a very old race of people who value knowledge and precision. They are very fond of mathematical and scientific beauty, they also have access to some of the more advanced technologies. The Sprites are much more harmonised with nature, they don’t feel the need for technological improvements that aren’t absolutely necessary. They live in a style very similar to the Native Americans. The Mechs are very efficient and utilitarian. They outnumber the other cultures put together and have colonised some of the more uninhabitable parts of the world including the frozen waste-lands. There is a history of tension between the races, which hinders good relations. Simple cultural differences have caused significant diplomatic problems. The users are members of a 4th race, this race is a space fairing race who like to explore. The users arrive in a Sprite trading village and through different plot devices get more and more involved in Sprite culture.

Ultimately, the users have to integrate themselves into the different cultures so that they can eventually integrate the cultures with each other in order to avert a huge disaster: a meteor heading for the planet. The solution to the problem will require the efforts and skills of all 3 races.

6 Early Stage Testing

The primary data collection method is a short questionnaire. Our initial focus is on the impact of the use of the physical station in front of a cinema screen and the use of the mobile phone as an interaction device.

Early design evaluation through the use of a comic book, rather than a simple storyboarding, has taken place with users (7 girls and 6 boys) [2]. The comic book was used to present the concepts to the users in an engaging way. Feedback from

these sessions was integrated into design and the result fed back into the process, it was found that the users were much more enthusiastic if they felt their input was having a direct effect on design. The results have been positive towards the use of the both the use of the phone and the physical station.

A Wizard of Oz style study is being used to investigate the practical and technical use of the physical station in conjunction with the RFID enabled mobile phones. This will also allow us to evaluate the impact of the cinema screen and use of the phone with the physical station, whilst saving development time and financial resources [11].

7 Summary

Through the combination of effective evaluation and design methods used in the creation of FearNot, we will create an engaging educational technology package that will use a variety of input and feedback methods combined with rich narrative to promote the use of positive friendship and integration strategies.

References

- [1] Berg, S., Taylor, A. S., and Harper, R. 2003. Mobile phones for the next generation: device designs for teenagers. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Ft. Lauderdale, Florida, USA, April 05 - 10, 2003). CHI '03. ACM Press, New York, NY, 433-440. DOI= <http://doi.acm.org/10.1145/642611.642687>
- [2] Bucolo, S., Billinghamurst, M., and Sickinger, D. 2005. User experiences with mobile phone camera game interfaces. In *Proceedings of the 4th international Conference on Mobile and Ubiquitous Multimedia* (Christchurch, New Zealand, December 08 - 10, 2005). MUM '05, vol. 154. ACM Press, New York, NY, 87-94. DOI= <http://doi.acm.org/10.1145/1149488.1149503>
- [3] Hall, L., Woods, S., Dautenhahn, K., and Sobreperez, P. 2004. Using storyboards to guide virtual world design. In *Proceeding of the 2004 Conference on interaction Design and Children: Building A Community* (Maryland, June 01 - 03, 2004). IDC '04. ACM Press, New York, NY, 125-126. DOI= <http://doi.acm.org/10.1145/1017833.1017853>
- [4] Hansen, T. R., Eriksson, E., and Lykke-Olesen, A. 2005. Mixed interaction space: designing for camera based interaction with mobile devices. In *CHI '05 Extended Abstracts on Human Factors in Computing Systems* (Portland, OR, USA, April 02 - 07, 2005). CHI '05. ACM Press, New York, NY, 1933-1936. DOI= <http://doi.acm.org/10.1145/1056808.1057060>
- [5] Henrysson, A., Billinghamurst, M., and Ollila, M. 2005. Virtual object manipulation using a mobile phone. In *Proceedings of the 2005 international Conference on Augmented Tele-Existence* (Christchurch, New Zealand, December 05 - 08, 2005). ICAT '05, vol. 157. ACM Press, New York, NY, 164-171. DOI= <http://doi.acm.org/10.1145/1152399.1152430>
- [6] http://journal.fibreculture.org/issue6/issue6_proitz.html
- [7] Koivisto, E. M., Suomela, R., and Koivisto, A. 2006. Ancient runes: using text input for interaction in mobile games. In *Proceedings of the 2006 ACM SIGGRAPH Symposium on Videogames* (Boston, Massachusetts, July 30 - 31, 2006). sandbox '06. ACM Press, New York, NY, 159-167. DOI= <http://doi.acm.org/10.1145/1183316.1183340>
- [8] Pering, T., Ballagas, R., and Want, R. 2005. Spontaneous marriages of mobile devices and interactive spaces. *Commun. ACM* 48, 9 (Sep. 2005), 53-59. DOI= <http://doi.acm.org/10.1145/1081992.1082020>
- [9] Rashid, O., Bamford, W., Coulton, P., Edwards, R., and Scheible, J. 2006. PAC-LAN: mixed-reality gaming with RFID-enabled mobile phones. *Comput.*

Entertain. 4, 4 (Oct. 2006), 4. DOI=
<http://doi.acm.org/10.1145/1178418.1178425>

- [10] Taylor, A. S. and Harper, R. 2002. Age-old practices in the 'new world': a study of gift-giving between teenage mobile phone users. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Changing Our World, Changing Ourselves* (Minneapolis, Minnesota, USA, April 20 - 25, 2002). CHI '02. ACM Press, New York, NY, 439-446. DOI=
<http://doi.acm.org/10.1145/503376.503455>
- [11] Verhaegh, J., Soute, I., Kessels, A., and Markopoulos, P. 2006. On the design of Camelot, an outdoor game for children. In *Proceeding of the 2006 Conference on interaction Design and Children* (Tampere, Finland, June 07 - 09, 2006). IDC '06. ACM Press, New York, NY, 9-16. DOI=
<http://doi.acm.org/10.1145/1139073.1139082>