

# Measuring the engagement of a museum visitor in interactive museum exhibits

Michael Shell, *Member, IEEE*, John Doe, *Fellow, OSA*, and Jane Doe, *Life Fellow, IEEE*

**Abstract**—Modern interactive museums offer visitors a dynamic learning environment, promoting exploration and encourage the excitement of discovery as visitors learn new concepts, as they are free to interact with the exhibits. In this paper we propose an architecture for an interactive learning environment (ILE) using a collection of commodity devices: a set of displays where different content is presented, a set of mobile devices for each visitor to interact and a Kinect sensor. The engagement affective state is predicted using various classifiers and a database of readings from the Kinect sensor. The architecture also addresses the problem of content distribution among devices. A case study of an interactive exhibit held in classrooms. The participants were students of Technologic Institute of Tijuana. Experimental results show that the proposed approach can predict the engagement affective state.

**Keywords**—*IEEEtran, journal, LATEX, paper, template.*

## I. INTRODUCTION

A museum is a public or private institution at the service of the society and its development. These exhibit sets of objects and information that reflect some aspect of human existence or its environment. The museum dates back to the Greco-Roman period, since museums have undergone many changes in terms of how to present the information thanks to technological advances that have emerged, this change has been most noticeable in the last century to date.

In addition to technology there are new techniques and methods to improve the user experience in these museums as interaction, user preferences, virtual and mixed realities among others. Since its beginnings the main objective of museums has been to preserve the cultural heritage, but also make information shown attractive to public in general, this part is a big challenge because each person thinks and assimilates information differently and one of the ways to solve this problem is by making the content adaptive. Interactive museums have been multiplying in recent year, many of which the idea of attracting the public using new technologies, currently there are studies that seek ways to solve the problem of making more attractive exhibits for the museum visitors as it does (aoki 2002; aoki 2002) where their electronic guidebook allows users to share auditory information (They hear each other) using a technologically mediated audio eavesdropping mechanism.

Reilly 2007 uses another approach oriented towards audio-visual experience where literary information shows through

high large screens where the user can interact with the museum with touch screens. Others besides dealing with how to present information have involved more with the user from using their personal information to use methods to predict the state of mind. In affective computing there are several affective states but one that goes hand in hand with learning which is the engagement, like all state of mind is difficult to identify. Allen tell us how to design exhibits and how not make it anti-engagement like using lots of content in multiple displays. In this paper we propose the architecture of an interactive environment which consists of the distribution of multimedia content in an exhibit where the content is displayed in sets of learning objects which we call environmental learning object, a simple sequenced implementation which will make the task of a museum guide establishing the order of the learning activities. And finally we use the second-generation Kinect sensor to capture video of the user and predict an emotion based on this catalog the exhibition state as something that engages the user or something that does not engage the user. To test this architecture we conducted an experiment in an interactive museum where we generate a learning activity, at the end of the activity we surveyed the user to obtain information from the user experience and affective state and compare it against the pronostic of the affective state and identify the least interesting activities.

### A. Subsection Heading Here

## II. BACKGROUND

### A. Interactive museums

Los Museos en la actualidad estan explorando las nuevas tecnologas digitales y mviles para mejorar la experiencia del visitante. Iniciativas van ms all de la tecnologa dentro de exposiciones e instalaciones , pero tambien incluyen usos ms generalizados de la tecnologa para crear experiencias interactivas para los visitantes a lo largo de un museo , as como experiencias a distancia para los que no pueden llegar hasta all.

### B. Affective Computing

### C. Learning Objects

### D. Kinect 2.0

## III. METHOD

To explore the impact of the exhibit on the users, a convenience sample of 40 students and teachers of Tecnologico de Tijuana aged between 18 and 40 years where the most frequent

M. Shell is with the Department of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA, 30332 USA e-mail: (see <http://www.michaelshell.org/contact.html>).

J. Doe and J. Doe are with Anonymous University.

Manuscript received April 19, 2005; revised January 11, 2007.

age was 19 years was undertaken. Participating students completed the activity shown on the exhibit. Which consisted of two videos with the themes of video games and movies, users used the display for a period of 4 minutes 20 users on the first day and 2 on the second day. Each user was shot with a film camera and a special camera that takes additional attributes like engagement , if not watching the display and positions of the eyes or mouth .

#### IV. RESULTS

#### V. CONCLUSION

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

#### APPENDIX A

#### PROOF OF THE FIRST ZONKLAR EQUATION

Some text for the appendix.

#### ACKNOWLEDGMENT

The authors would like to thank...

#### REFERENCES

H. Kopka and P. W. Daly, *A Guide to L<sup>A</sup>T<sub>E</sub>X*, 3rd ed. Harlow, England: Addison-Wesley, 1999.