

## SPECIAL SESSION

### Measuring Engagement: Affective and Social Cues in Interactive Media

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#### Introduction

In game or entertainment environments the ‘user’ may take part in events that require bodily interaction with sensor-equipped environments. Embedded motion-capture and gyroscopic devices capture movements. Thanks to Nintendo's remote Wii, motion-controlled games are now widespread. Cameras, microphones, pressure sensors, and proximity sensors have been added. Thanks to Microsoft's Xbox Kinect whole body interaction games have become popular. Apart from entertainment, such sensor equipped and game oriented environments can be designed to improve health conditions, sports performance, or (therapeutic) physical rehabilitation.

More sensors are becoming available, allowing a game to obtain more information about a player, in particular his or her bodily and emotional conditions. In addition, these sensors allow more input modalities for interaction with an environment [1]. There are many examples of advanced games where posture, gestures, body movements, facial expressions and brain activity are among the modalities that are used for control. Control can be direct, but it can also be mediated (for example through a balance board, a tangible or a wearable). Observations of the face and body can be used in different forms, depending on whether the user may take the initiative to control the interaction or whether the application takes the initiative to adapt itself to the user. Therefore we can distinguish:

- Control: the user consciously produces facial expressions, head movements or body gestures to control a game. For example, to navigate, move game characters, or change appearances.
- Adaptation: the gamer's spontaneous facial expressions and body poses are interpreted and used to adapt the game. For example, this information may lead to changes in the difficulty level, the appearance of the game environment, the interaction modalities, or the narrative.

The game environment is not necessarily at home. It can be a training and simulation field or a less controlled setting such as an urban area, where bodily movements and activities are detected by mobile devices and webcam networks.

#### Engagement

One of the key issues in (video) games and in interactive entertainment and art is engagement. Research questions are: how can we design and predict engagement? How can we adapt a game to its users and audience to increase or decrease engagement? Again, when we talk about a ‘game’, we are talking about environments that provide entertaining interaction opportunities to a ‘user’. Automatically obtained engagement information allows adaptation of a game or game environment by the game controller. That may include physical and virtual appearance, availability and characteristics of interaction modalities, feedback by actuators, game narrative, and game strategy. It should be mentioned that above we used the term ‘engagement’ in an informal way. Numerous terms and definitions have been introduced to describe aspects or features of engagement, or the other way around, to define engagement as an aspect of user experience concepts such as presence, levels of immersion or flow [2].

The questions mentioned above need to be investigated. Knowledge about factors that affect engagement can be used in game design and game evaluation. Although there is theorizing around concepts such as flow, presence,

and immersion, there is a considerable gap with applied knowledge coming from design, performing arts, narrative and drama theory. Let alone the ‘gut feeling’ of a game designer who has played games for thousands of hours himself and has access to the experiences of hundreds of game testers that have spent hundreds of hours playing a particular game before it gets its final form and is made publicly and commercially available.

Nevertheless, detecting different levels of engagement during game playing can make it possible to make decisions about increasing or decreasing a level of difficulty, to provide in-game explanations, to adapt the storyline, or to adapt the behavior of game characters. It should be noted that results on engagement modeling in sensor-equipped game, entertainment and interactive art environments do not necessarily translate to other applications where, for instance, task efficiency is an important issue. In the game and entertainment situations we address, immersion, presence, and flow need to be considered when investigating user experience, user satisfaction, and user enjoyment. As mentioned by Berthouze et al. [3], there are lots of theories that attempt to define and model aspects of engagement but, “most theories of engagement have focused purely on its mental aspects”.

## **Special Session “Measuring Engagement”**

The aim of this special session at Measuring Behavior 2012 is to look at engagement and ways to measure engagement in situations where users are not glued to their chair and keyboard, that is, in sensor-equipped environments that are able to perceive nonverbal interaction behavior. And, moreover, we focus on activities that are not necessarily aimed at performing a particular task in the most efficient way. Rather the focus is on enjoyment during performance and satisfaction during and after finishing the interaction.

Real-time information providing sensors allow us to detect cues from the behavior of one or more participants in the environment from which different levels of engagement during performance can be concluded. And, also, different kinds of feedback and adaptation of the game environment can be decided. Social and affective behavioral cues [4], to be detected from nonverbal behavior, need to be recognized and interpreted in order to be used as input to our algorithms that provide us with information about engagement, immersion, and flow. All these issues will be covered by the six contributions for this special session at Measuring Behavior 2012.

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## **SPECIAL SESSION CONTENTS** (sorted by paper ID)

### **Video-Based Multi-person Human Motion Capturing**

Nico van der Aa, Lucas Noldus (Noldus Information Technology, The Netherlands) and Remco Veltkamp (Utrecht University, The Netherlands)

### **Making Ambient Spaces into Playgrounds**

Dennis Reidsma, Daniel Tetteroo and Anton Nijholt (Human Media Interaction / Creative Technology, University of Twente, The Netherlands)

### **Building Corpora of Bodily Expressions of Affect**

Marco Pasch and Monica Landoni (University of Lugano, Switzerland)

### **Measuring Fun and Enjoyment of Children in a Museum: Evaluating the Smileyometer**

Frans van der Sluis, Betsy van Dijk and Bert Perloy (University of Twente, The Netherlands)

### **On Making Engagement Tangible**

Egon L. van den Broek (TNO; University of Twente, Radboud University Medical Center Nijmegen, The Netherlands)

### **What Can Body Movement Tell Us About Players' Engagement?**

Nadia Bianchi-Berthouze (University College London, UK)

### **References**

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