

# Summary of the workshop Affective Interaction with Avatars @ Ambient Intelligence 2015

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**Abstract.** The workshop Affective Interaction with Avatars was held at the 2015 Ambient Intelligence conference, in Athens, Greece, during November 11<sup>th</sup>. The workshop focused on the affective interaction with Avatars, also known as Embodied Conversational Agents. This technology is increasingly used in the area of Ambient Assisted Living to provide natural interfaces for elderly. Several aspects of affective interaction (e.g recognition of the emotional state of the user, modelling of the agent's behaviour, and feedback via animated facial and/or bodily expressions) will be discussed during the workshop. There were four presentations and twelve participants from seven countries joining an open discussion.

**Keywords:** Avatars, Emotion Recognition, Affective Interaction, Ambient Assisted Living

## 1 Introduction

<sup>1</sup>Avatars, also known as Embodied Conversational Agents (ECAs), have been successfully employed in several domains, including gaming, education, health, or training [1]. Recently, the domains Ambient Intelligence and Ambient Assisted Living have also been active in incorporating avatars as a front-end interface for elderly oriented solutions and services [2, 3]. Avatars provide an intuitive and natural way for elderly users to interact with intelligent systems that offer services or help them with their daily activities.

Since emotions play a fundamental role in human communication, the affective capabilities an agent employs have strong impact on the perception of its intelligence,

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quality of interaction, and more importantly, on user engagement. Affective interaction involves several aspects like the recognition of the users affective state, based for example on speech and video processing, the computational modelling of the agents affective state and behavior, expression of affect via animated facial and/or bodily expressions, dialogue management which gracefully handles errors and interruptions, etc.

Successfully addressing open challenges in these domains can increase the frequency and quality of interaction, leading to a better acceptance of the agents and, in general, of AAL solutions. Principles of affective interaction may be similarly applied to robot-based systems to gain similar benefits in the domain on Ambient Intelligence.

## 2 Workshop topic

This workshop aimed at discussing different aspects for the affective interaction with avatars and robots. We invited authors to present contributions on the following topics:

1. Affect recognition using different modalities, e.g. physiological signals, voice, facial expressions, and gestures
2. Affect fusion from different modalities under different time constraints
3. Advanced dialogue management for affective avatar interaction
4. Computational models of moods, emotions, personalities and memory
5. Affective and empathic behavior in expressive avatars
6. Evaluation studies and case studies from a point of view of practical applications

## 3 Workshop Summary

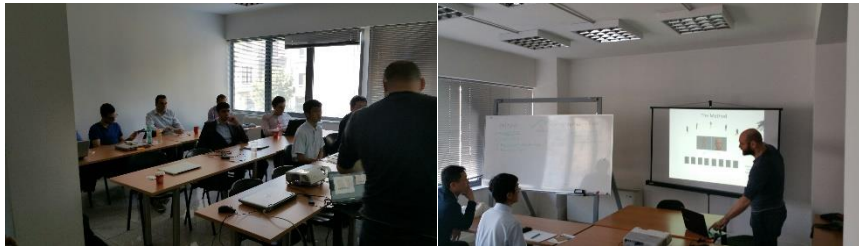


Fig. 1 Impressions of the AFFIN workshop in Athens, Greece, at November 11<sup>th</sup> 2015.

The workshop AFFIN - Affective Interaction with Avatars was held at the facilities of the Hellenic Open University in Athens, Greece, in conjunction with the 2015 conference on Ambient Intelligence during November 11<sup>th</sup> 2015. Twelve participants from seven countries joined the presentations and open discussion.

### 3.1 Presentations

In the first part of the workshop there were four presentations of submitted papers. Initially, Donato Cereghetti presented the paper by Cereghetti et al. that discussed findings of a user study of primary and secondary users of Virtual Support Partners (VSPs) [4]. Important findings are that both non-verbal and verbal behavior should display a supportive and cheerful attitude, the preference that VSPs should be guiding instead of directing, and that the social intelligence of VSPs is important. The last factor includes personality, attitude, and aspects of face-to-face interaction.

The second presentation was by Fabrizio Nunnari who presented DeEvA - a Depot of Evolving Avatars [5]. The DeEvA platform allows the creation of avatars based on personality traits as inputs, e.g. if an avatar should be trusting, or modest. This method uses Interactive Genetic Algorithms to modify the visual characteristics of avatars [6]. The authors presented three experiments, the first two of them discussed in detail in previous work [7]. The new experiment evaluated correlations between the personality trait agreeableness and gender. The authors found significance in six of seven facets.

The third presentation was given by Andreas Braun, presenting their paper on the design of an appropriate system architecture for VSPs [8]. It describes how so called conversational agents can be designed to provide a virtual support and help in daily life activities of the older adults. The paper describes the concept and the idea of a virtual support partner and the concrete realization of a virtual support partner in the EU funded Miraculous-Life project. It describes the deployment setup, the components as well as the architecture and gives some conclusion and lessons learned.

The last presentation was held by Donato Cereghetti on behalf of Andreou et al. [9]. They discussed avatar-supported systems in the context of Ambient Assisted Living. These systems are typically supported by a diverse set of services for, e.g., social daily activities, leisure, education and safety. This paper studies the importance of specific services for two organizations, namely MRPS in Geneva, Switzerland and ORBIS in Sittard, Netherlands. Based on this study, we present the design of a backend framework that supports Avatar interaction by means of a comprehensive set of services for safe and independent living.

### 3.2 Discussion

The discussion was held in form of an open panel, whereas the speakers formed a small panel and the other participants were invited to join the discussion. This part of the session was driven by five topics, provided by Christiana Tsiourti. These and the resulting discussion, we will outline in the following section.

*What are the main abilities of avatar companions for elderly, domain-specific functionality or communicative soft skills? And what interdependence might exist between both?*

The discussion led to most agreeing that avatars should prompt behavioral change, even for older adults. The avatars should have the ability to learn and be really intelligent, particularly for their communication skills. One discussant remarked that avatars should pass the Turing test.

*Many problems are unsolved. What are the greatest challenges for virtual agents in theory and for implementations (e.g. applications)?*

The quality of the graphics and speech synthesis remains a huge problem, even nowadays. There is a huge discrepancy of the systems that are available to research and high quality modeling tools that are used for computer games and movies. However, there was also a discussion about how much realism is actually needed, with a participant from Japan mentioning that cartoon characters might be more likeable by many users and that cultural aspects have to be considered.

*What is the relationship between empathetic abilities of avatar systems and acceptance/trustworthiness in Human-Companion-Interaction?*

The avatars should appear very natural and have a high consistency between verbal and non-verbal aspects of the communication, which is still a problem in systems currently used. The context recognition and correct response is important. Eye tracking was considered a good technology for that and that wearable devices might provide additional information.

*Given that avatar technology can assess emotions better than the involved user themselves or other humans. Will users accept that? Do you consider that as an ethical problem?*

The discussants agreed that the technology will be able to reach that quality in the future, but isn't quite there yet, unless the experiment is very constrained and controlled. Researchers and developers have to be very careful in their design of such systems, when this point is reached. Privacy is a problem in this regard and there was a consensus that this should be considered in implementation and eventually legislation. There was a remark that systems like this might change human behavior eventually - if the technology is available and people are aware, they might want to avoid showing their actual emotional state.

*Commercial companies expect a tremendous growth of applications of affective avatars. In what domains do you expect the greatest growth?*

Initially, the areas of education, entertainment, the clinical domain and sales/marketing were identified as having a high potential. The emerging market of games and persuasive games was deemed as particularly interesting in the coming years, given the large investments by companies and a drive towards more realistic and convincing avatars in this industry.

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