Chapter 6
A Survey on the Use of Emotions, Mood, and Personality in Ambient Intelligence and Smart Environments

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ABSTRACT
This Chapter is a survey dealing with the use of emotions and mood to characterize an Ambient Intelligence system. In particular, a key aspect of the described research is the assumption that each level of an Ambient Intelligence infrastructure (e.g., sensing, reasoning, action) can benefit from the introduction of emotion and mood modeling. The Chapter surveys well-known models (e.g., OCC, Big Five – Five Factor Model, PAD, just to name a few) discussing for each one Pros and Cons. Next, architectures for emotional agents are discussed, e.g., Cathexis (assuming the somatic marker hypothesis proposed by Damasio), Flame, Tabasco and many others. Finally, specific implementation examples of emotional agents in Ambient Intelligence scenarios are described.

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INTRODUCTION

Traditionally, emotions and affects have been separated from cognitive and rational thinking; they have a bad connotation on what is related to the individuals’ behaviour, in particular on what is related to the decision-making process. However, in the last years, researchers from several distinct areas (psychology, neuroscience, philosophy, etc) have begun to explore the role of the emotion as a positive influence on human decision making process. Current research in Artificial Intelligence demonstrates also a growing interest in emotional agents. From human-computer interaction, to development of believable agents to the entertainment industry, and to modelling and simulating the human behaviour, there is a wide variety of application areas of emotional agents.

Rosalind Picard enumerates four major reasons to give emotional characteristics to machines (Picard, 1995):

- Emotions may be useful in the creation of robots and believable characters with the capacity to emulate humans and animals. The use of emotion gives agents more credibility;
- The capacity to express and understand emotions could be very useful to a better association between humans and machines, making this relationship less frustrating;
- The possibility to build intelligent machines, although this concept is a little bit vague;
- The possibility to understand human emotions by modelling them.

To achieve the goals identified by Rosalind Picard researchers have been working on the topic, covering several different areas like for example, sociology, psychology, human-machine interaction, computer vision and sensing, virtual environments, and, obviously, Artificial Intelligence. Furthermore, in this area we have a large set of different applications like for example: virtual reality, decision support, computer games, and ambient intelligence.

In this chapter we will focus on the role of emotion, mood, and personality in the development of Ambient Intelligence systems and Smart Environments.

The first part of the chapter will describe methods to deal with emotion, mood, and personality in computer-based systems. Examples are OCC model (Ortony, 2003), Big Five model (McRae and Costa, 1987) and PAD model (Mehrabian, 1996).

Then emotion, mood, and personality can be considered in all the roles covered by Ambient Intelligence systems, and Smart Environments, as proposed in (Ramos et al., 2008), namely in the following roles:

- helping in the interpretation of the environment situation;
- representing the information and knowledge associated with the environment;
- modelling, simulation, and representation of the entities involved in the environment;
- planning about the decisions or actions to take;
- learning about the environment and associated aspects;
- interaction with the human being;
- action on the environment.

Some Ambient Intelligent systems and Smart Environments dealing with emotion, mood, and personality will be presented at the end of the chapter.

EMOTIONAL, MOOD AND PERSONALITY MODELLING

In this section we will describe the main models and methods to deal with emotion, mood, and personality that are adopted by Computer Science community.