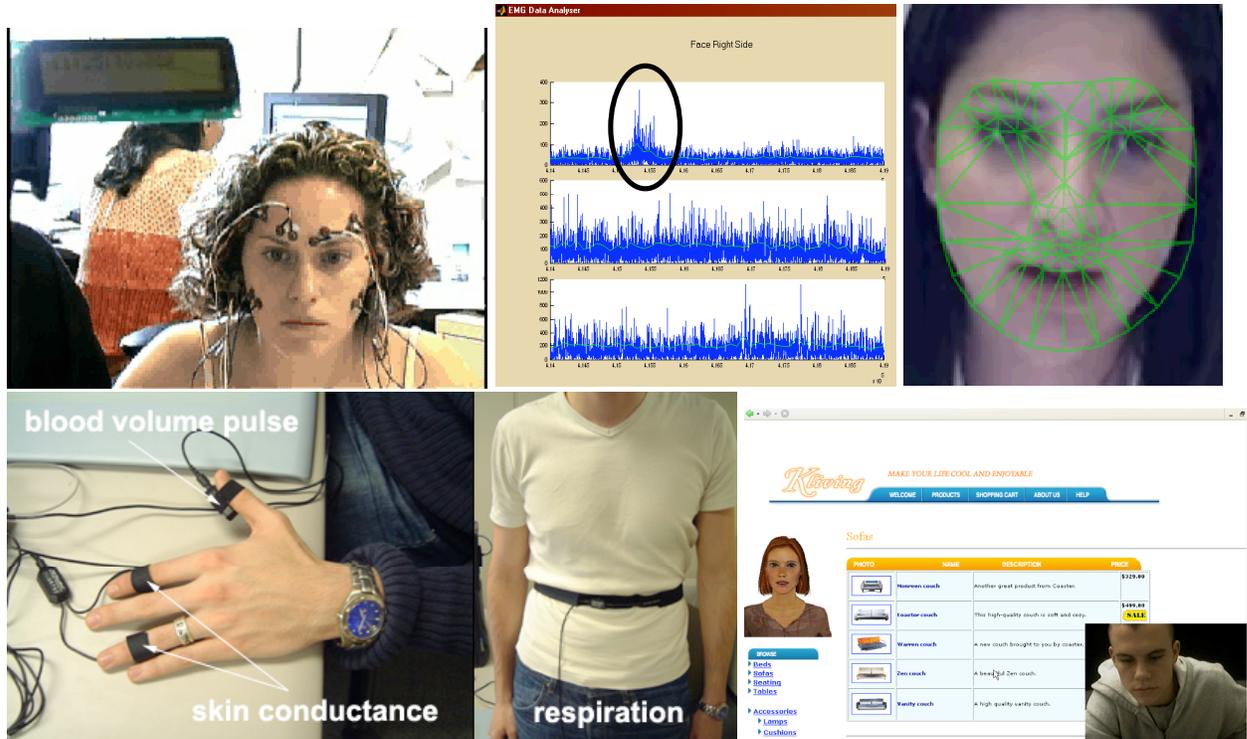


Multimodal Affect Sensing in Human-Computer Interaction

MAP-I Doctoral Dissertation Proposal



Background

Consider the following scenario: You are running short on time, the software does not seem to share your urgency: you need to insert a few pictures aligned vertically next to the column of text and you still need to review everything before submitting the final version. The text layout keeps shifting all over the page as you insert the pictures and resize them. You frown, you get agitated and start to sweat, it is obvious that the stress is taking over you.

If we were observing that moment, we would most likely be able to recognize the tension in our user, maybe through the agitated movements, maybe through changes in our user's facial expressions or even the perspiration. The body language, and in particular the grim face, are important clues to understand the user's emotional distress.

The ability to interpret others' behaviors in terms of their cognitive and emotional state (mental state) is an essential skill in social interactions. However, in human-computer dialogue the computer plays an autistic role, as it is completely indifferent to the dynamics of the user state. This proposal addresses the sensing of user's state as an important feedback mechanism for the computer to analyze its own actions and better understand the context of the interaction.

The topic of this proposal falls within the research field of Affective Computing. The term *Affective Computing* was introduced by Picard¹ to refer to all “computing that relates to, arises from, or deliberately influences emotions“. It is a recent field within the Human-Computer Interaction topic that has been receiving increasingly attention within the last years, but with a vast space for new research and innovative approaches.

The applications of user emotional/cognitive state detection goes beyond the desktop computer, and an argument can be made that is in fact better applied in more ubiquitous scenarios. A commercial example is provided by Attention Technologies a company that develops a device in the car to detect when the driver drowsiness.

In general, the emerging diversity of computing devices that we carry around, used by one specific user, opens the opportunity to develop one-on-one relationships, in the sense that those devices get to know intimately the user. The relevant quality of those devices would be their ability to integrate seamlessly within our daily-lives, similar to the perfect assistant that knows our likes and adapts to our requests. The qualities users will appreciate in ever ubiquitous computing will not be described in terms of speed or memory capacity, but instead on their ability to connect with the user, understand him and anticipate him and the surrounding environment. With the physical dimensions of those devices constantly decreasing there is the possibility for those to be incorporated in clothing, accessories and objects we interact with, imperceptibly monitoring our reactions and all relevant factors that reveal our preferences and physical state, and disambiguating them through the contexts of our environment and history.

Objectives

It is the intention of this work to address applications that incorporate user’s emotional and cognitive states through a variety of sensing modalities. While numerous research has focused on specific sensing technologies, such as physiological, facial, vocal, body movement, posture, the combination of several of those modalities could provide a more robust mechanism to better devise user’s emotional and cognitive state.

It is expected that the doctoral student is able to develop studies looking into different combinations of sensing modalities to infer on user emotional state. Investigate new approaches to integrate affect in the human-computer dialog. Devise contexts and implement prototypes where such approaches seem appropriate.

Place

Lab. Realidade Virtual e Processamento de Imagem, Campus de Azurém, Guimarães

Supervision

Pedro Branco

Departamento de Sistemas de Informação

Universidade do Minho

pbranco@dsi.uminho.pt

¹ *Affective computing*. Cambridge, MA: MIT Press, 1997.