

Unobtrusive Emotion Sensing in Everyday Life

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Decades of laboratory research in psychophysiology have shown us that our bodily reactions are connected to our emotions and to our mental state. Well-known examples are our heart rate reactions to demanding events, the change in our skin conductance in cases of various (positive and negative) types of arousal, and the way our breathing patterns reflect surprises and other excitement. These physiological parameters and many more thus can give us insight into how we feel and how we react to situations.

This opens up opportunities for applications in everyday life in various areas of society. For instance, becoming aware of our bodily reactions might also help us to realize how we feel about a certain situation. It might be a source of reflection for ourselves, so that we get grip on the events that comprise our busy lives. Or we could trust someone else to receive our physiological signal, maybe our romantic partner, with whom we want to feel close despite a physical distance. Maybe our physiological signal could also serve as an additional clue for professionals who provide care to us, a clue that helps them to treat us well and keep us comfortable. As a last possibility, our physiological signal could be interpreted by the devices we use, so that they can adapt their functioning to the mental state we are in or would like to be in.

However, several steps have to be taken to arrive at really working products. For instance, the physiological measurements have to be done in an unobtrusive way. Some people find it acceptable to carry a heart measurement device during running, but most of us would not think of wearing a similar device throughout each and every working day. Thus unobtrusiveness is an important feature in many of the applications mentioned above, and it fosters the research and development of miniaturized wearable sensors.

In addition, the measured data have to be interpreted correctly for each individual. Traditional psychophysiological research usually averages effects over people in order to get significant results. In real life applications, however, signal interpretations have to be one-shot, first-time right, which considerably complicates things. On the other hand, when doing intra-individual measurements, it is possible to look at smaller changes and to really get to know the user and his reactions, and thus increase the accuracy of the interpretation.

The need for unobtrusive devices and individual interpretations gives rise to a new branch of more applied research, of which I'll show a few examples: a wristband skin conductance sensor, and individual modeling of the relation between heart rate and emotions. I will also present and discuss some prototype applications we based on these skin conductance and heart rate signals: an affective music player that directs you mood and a live connectedness token for romantic partners.