The Laser Aura: a prosthesis for emotional expression

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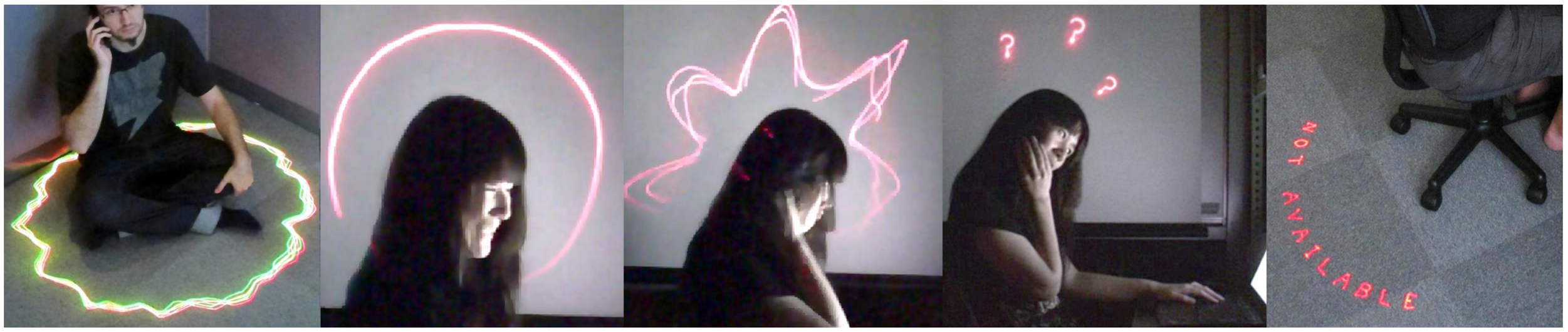


Abstract

We propose a wearable device capable of translating bio-sensed data into cartoon-like graphics projected in the physical surrounding. Such *'expressive Laser Aura'* (LA) may serve for biofeedback purposes; but more interestingly, as the display extends past the wearer's personal space it could complement non-verbal social communication by giving others an instant cue about a person's real inner state.

In this preliminary work, we explore a proof-of principle scenario: the possibility of enhancing empathic behavior at the working place, where people have little or no time to explicitly communicate a need for help, or on the contrary a need for isolation. The subject is sitting at the office desk; the LA (presently non-wearable) is projected on a nearby wall or on the floor. It takes the shape of an halo that changes its behavior as a function of the subject stress level.

Technologically mediated Self

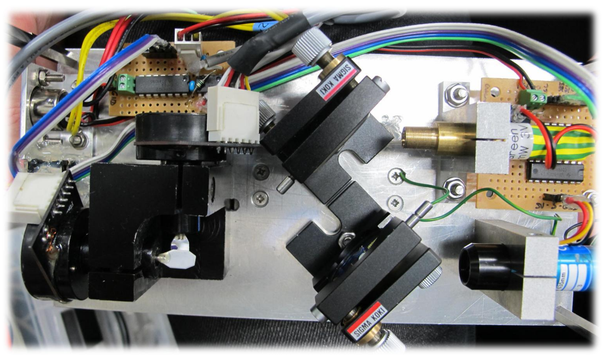
This research extends previous works in our lab on the technologically mediated self, such as the Haptic Radar [Cassinelli et al. 2006] or the Light Arrays [Wilde et al. 2010]. Externalizing subtle psycho-physiological states using simple visual cues may enhance human-human interaction in situations where natural communication channels are temporarily recruited in other tasks, or defective.

For instance, a LA could inform others, at a glance, about a person's 'availability status' - as currently done in online social software. Also, by detecting, amplifying and possibly pre-processing autonomic function data (heart rate, stress level, etc) before projection, the device could help pathologically introverted people to engage in social interaction, or perhaps facilitate understanding of people on the autism spectrum.

In a sense, the LA works as the reverse of the emotional prosthetic system described in [El Kaliouby et al. 2006], in which a wearable device with a tiny camera reports to its user about *other's* people emotional states (such as boredom). The LA is in fact a semi-autonomous extension of the body and mind, and as such can serve a variety of purposes - including attracting social attention by enlarging or retracting the aura as a peafowl tail, or even sending signals of distress.

Prototype

In the prototype demonstrated here, the subject is sitting at the office desk; the LA is projected by a vector graphic laser projector on a nearby wall or on the floor; it takes the shape of an halo that changes its behavior as a function of the subject stress level.



Of course, prosthetics for emotional expression can be implemented without laser display technology: visual, auditive, tactile, thermal or even olfactory cues could be generated by embedded devices on clothing (or by changing the shape or color of the clothing themselves). Psycho-physiological information could even be broadcast wirelessly and activate nearby cell-phones vibrators, or be uploaded on a blog or twit - effectively extending the emotional aura online. However, by recruiting the immediate surrounding for display, the LA has expressive power spanning intimate, personal, social and public spaces. Also, laser vector graphics offer a form of display that is naturally minimalistic in comparison to conventional projectors (too much information could clutter human-human communication instead of enhancing it).

Future works

In the short term, we plan to develop the current prototype by replacing the accelerometer by a skin conductance sensor to measure arousal levels. In the future we plan to make the device wearable, as well as give it the ability to represent more complex states such as emotions by using affective computing methods and techniques (including cameras for face tracking and software to analyze the user interaction with the GUI).

References

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