



Development of haptic communication processes between human and machine

Impact Case Study

Giorgio DALL'OSSO

Alma Mater Studiorum – University of Bologna

Department of Architecture

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Supervisor(s)	Prof. Flaviano Celaschi Prof. Michele Zannoni

Abstract

This research focuses on the relationship between enabling technologies and the human body. Technology miniaturization and its increased use in environments raises questions about its integration capability with the body and its behaviours. The problematic research context concerns wearable devices and the design of solutions to solve novel needs or enhance human senses. Scientific literature and case studies describe human foot as an effective platform for experimenting with haptic interfaces for human/machine communication, capable of connecting the body with site-specific data. The foot, a dual and symmetrical motor element, has a high perceptive quality and is morphologically suitable for emerging technologies application. Its border



position, between space and body, allows stimuli collection from both areas. Bibliography indicates how pressure, compared to vibration, is preferable in haptic communication since it is a natural component of the body's relational languages. Finally, the multidisciplinary analysis reveals the opportunity of developing rhythm as a structural component of messages.



The relational links between rhythm, body and human behaviour are evident in some mechanisms: rhythmic entrainment, rhythmic mimesis, synchrony. The relationship between foot, pressure and rhythm becomes an affordance of the space, capable of suggesting, emphasising or activating behaviours. The podotactile rhythm is presented here as a union of these elements. In this thesis it is described through the characteristics, the fields and actions application and the data collection from the tests carried out using the build prototypes. The quantitative and qualitative analyses of the movement and emotion reading data show how the use of a haptic rhythmic language in the foot expresses high potential for integration with the body while respecting comfort and attentive balance in pre-existing action flows. The results open reflections on several new design application in museum, working and urban contexts.

Summary of impact beyond academia

Upon completion of the PhD, part of the research carried out was used as a resource for the scientific development of the international symposium 'Future Design Human Body Interaction'.

The international symposium was born to build a network of professional researchers who deeply investigate the state of the art and the possible future evolutions of human-machine interfaces.

Underpinning research, context and summary of methodology

How contemporary man shapes himself is the focus of this research, which focuses on the ways in which the body dialogues with space through recent enabling technologies.

In this contemporaneity, the body becomes cyborg through the densification of intra- and extra-dermal technological interventions (Maldonado, 1997, p. 139). How is it possible to maintain the balance between the factors involved?

A technological body capable of continuously producing digital information (Celaschi & Casoni, 2020, p. 49) must find ways of transducing the same that enable it to live in balance with the overground agora (Zannoni, 2018, p. 38) dense with geo-referenced digital data in which it finds itself immersed.



The continuous negotiation between technological possibilities and the rethinking of human actions identifies the new horizon of interaction design towards the search for balance understood as psycho-physical well-being.

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Details of impact

International symposium with participation of researchers and companies.

Moderation of the panel discussion "Designing for wellbeing: data and behaviour changes" during the international symposium. The round table was hosted by leading companies from the national territory.





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