Chapter 2
Design Elements for the Implementation of Threshold Crossing In and Out of Mixed Reality

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ABSTRACT

The chapter presents research on the relationship between the human body and the space implemented by data and digital interfaces. In this relationship, technology plays a mediating role. The research introduces the concept of a digital threshold to an interactive space that has the capacity to preserve the cognitive well-being of users and invite interaction. To do this, some characteristics are identified that can be used in the design with the aim of relating the body to the devices in the space. Pressure stimuli, rhythm, and body symmetry are the components of a natural language capable of activating a natural motorial reaction mechanism. The details of the experimentation carried out and the processing of the data collected through data visualisation are provided to support the argument.

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INTRODUCTION

Mixed Reality is a multidisciplinary field of study, in which macro and micro scenarios using *Virtual Reality* and *Augmented Reality* as seamless solutions are described. *Mixed Reality* is applied inside architectural or natural spaces where human users carry out their daily activities.

This research aims to explore the current context of *Mixed Reality* to understand how the integration of *wearable* devices has triggered the interaction on the body, linked to the attentional processes through the visual, tactile, and pressure feedback.

In this framework, the primary relationship investigated by scientific research is between the human body and space. In the contemporary world, space is not only describable through the sensoriality of the body; digital information referenced both to places (Zannoni, 2018) and to the actions performed by the user are anchored in space. When this information becomes part of perception, it contributes to defining the situational characteristics in which the human body lives; moreover, by adding to the pre-existing sensory reality, it consciously or unconsciously modifies the behaviors of humans. Scientific and applicative research devotes continuous work to the aim of increasing the quality of the mediation performed by technology in the relationship between the body of the individual user and the digital information referenced to space.

The paper presented explores some characteristics of body-space mediation devices. It identifies the threshold of entry and exit from an immersive experience as a design objective that can be developed through haptic feedback elements. The areas in which a potential spillover of the study is imagined are marked by spaces in which it is possible to enter and exit mixed reality experiences such as could be workplaces or cultural fruition environments.

BACKGROUND

Embodiment theories emphasize the close interconnection between body and mind; what happens on one level always affects the other and vice versa.

The motor and sensory capacities and past experiences that every human has had in the natural environment define how humans think. These theories show the way forward for researchers and designers: working from the human body means knowing the most subtle mechanisms that regulate it and designing with great respect for the balances at play.

Every extension of the body and every piece of information that manifests itself on or around it always generates complex effects; these act on both perception and behavior. For this reason, a primary research objective is to develop mediating technologies that are able to manage the wellbeing of the human body.

The advances in ergonomics indicate well-being as the sum of all the levels that define the human factor (anatomy, physiology, cognitive resources, pleasantness, etc.) and the environmental context of reference (Sicklinger, 2020). Measuring well-being in the contemporary world is possible through the analysis of qualitative data and quantitative data (De Luca, 2016). Technological developments in sensors and artificial intelligence allow the collection of data that detail the motorial behaviors in space and track the emotional states of users. Reference technologies are those derived from human face analysis (*face tracking*), attention analysis (*eye tracking*, *body orientation tracking*), detection of physiological parameters related to stress levels (skin conductance EDA, heart rate variability HRV, etc.).