PeR: Designing for perceptive qualities

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Abstract
The design PeR was created as part of our research on how to design for perceptive qualities in objects. PeR, or perception rug, is capable of showing perceptive activity related to actions from a subject and related to other events. The integration of conductive yarns makes PeR sensitive to the touch of a subject. Furthermore, the use of nylon threads enables a body of light to behave within its surface.

Keywords
Designing for Interaction, Perception Theory, Perceptive Qualities, Design Platform

1 Introduction
PeR integrates conductive and optic fibres, which respectively are used to sense the touch of a subject and to let a body of light act within the surface of the rug. The design is part of a research project that investigates how to design for perceptive qualities in objects.

1.1 Theory
The starting points for this research are considerations of the phenomenology of perception [1] and the ecological psychology [2]. Based on these notions, perception, in this case, is described as inherently active. Perception is the result of actions we undertake and the consequent sensory feedback we experience. This makes perception a very bodily and, therefore, personal matter. What I perceive depends on what I can act upon with the body I have. [3] Perception, being inherently active, also brings forward the idea that there is a pre-conceptual meaning of the world. In other words; the world means something to us before thinking and recollection. [4]

Merleau-Ponty’s approach of the phenomenology of perception, in which perception is described as inherently interactive, is important for this research. Perception is an interplay between the perceiver and the perceived. [1] These notions have been recently operationalised by researchers at the University of Compiegne, France. The French researchers conclude that ‘there are two kinds of perceptions over time: perceiving the other as part of the environment, versus perceiving the activity of the other perceiving me. It is by switching between these two kinds of perceptions that it becomes possible for one subject to understand the position from which the other subject perceives the scene.’ [5] To make a feeling of sharing a common space between subjects possible, this constitution of the other subject’s perspective or ‘point of view’ is essential.

Our main focus of investigation is if and how it is possible to design for perceptive activity in an object, in order to create perceptive interplay between it and the subject. As the working hypothesis for our ongoing research we state that this perceptive interplay, of
perceiving an object as part of the environment versus
the object perceiving the self, results in a greater
feeling of involvement of the subject [6]. The next
diagram (figure 1) gives an overview of the perceptive
connections between a subject and the designed object
with perceptive quality. Part of this scene is also an
event. Both subject and object with perceptive qualities
could perceive this event.
A very basic example one can consider is an ordinary
outdoor lamp. The lamp (Object 1) is capable of
detecting the presence of an intentional subject as
well as the outside lighting conditions (event). Also,
the subject is able to perceive this event, as well the
perceptive capability of the lamp when it reacts to its
dark surroundings and the presence of the subject by
turning on the light.

2 Description PeR
PeR is an exploration of how the theory mentioned
above is applicable in design. The structure and open
form of PeR allows for the exploration and the design
of different behaviours. This allows it to become a
platform for design.
In between the threads of the basic rug, conductive
yarns are integrated. These conductive yarns are
connected to several capacity sensors. An electric
capacity change is detected when the rug is touched by
the subject. This difference in capacity is converted into
an electric signal by the capacity sensor, which, in turn,
is read by means of an Arduino (electronics prototyping
platform). The detection of touch makes PeR sensitive
to the perceptive activity of the subject. PeR is capable
of reacting to and evoking these perceptive actions of the
subject by the behaviour of its integrated body of light.
In addition to the conductive yarns, nylon threads were
integrated in the rug. This thread has similar properties
as glass fibre as it is able to transport light. The soft feel,
transparency, and flexibility of the nylon thread make
a smooth integration in the carpet possible. A grid of
LEDs is mounted under the nylon threads. This enables
PeR to show behaviour by means of light.
The electric signals gathered by the use of the
conductive yarns are used as sensory input by the
algorithm behind PeR. Based on this sensory input the
position of the body of light is adjusted. The algorithm
allows for a smooth and natural-like behaviour as the
position of the body of light is adjusted gradually. This
body of light is reflected within the rug through the light
of the LEDs spread by the nylon threads.

3 Platform for design
Through the integrated nylon threads, a body of light
behaves within the carpet. The behaviour of this body is
dependent on an underlying algorithm. The design can

Fig. 1. Subject 1 is a person with normal perceptual capabilities.
The subject perceives the object and an event as result of his or
her actions towards them and of the sensory feedback gained
by these actions. Note that sensory input can also evoke actions
by the subject. Next to the subject ‘Object 1’ is presented is
presented. This object is an object with perceptive qualities (like
PeR). This object is also able to perceive the subject and the event.

Fig. 2. Overview PeR, the perceptive action (the touch) of the
subject results in perceptive actions by means of light.
be used as a platform for the exploration of perceptive behaviour. For example the body of light can follow the subject’s touch directly or on a humble distance. In figure 3 an impression of the light body following the subject’s touch is given.

Behaviour towards an event such as, reacting to music, to the dynamics of people, to incoming mail or to activity in time and over distance etc. is also possible. In this case PeR is the object with perceptive qualities. The behaviour of the body of light shows the perceptive capabilities to the subject.

Different design characteristics, like the size of the light body, the speed by which the body moves, its shape, focus and direction, can be adjusted in order to design behaviour. These characteristics could also adapt over time. This means that the light body could get notion of ongoing perceptions. For example, PeR gets bored, irritated or happy depending on its perception of the subject and the event. Notion of ongoing perceptions implies that PeR is sensitive to the dynamics by which it is touched. Hence PeR could show different reactions to, for example, stroking and hitting.

The design of perceptive behaviour is essential to our research and to our design of PeR. As static images don’t show this behaviour we provide a movie at http://dqi.id.tue.nl/per.

4 Further research

PeR is a first example of why and how to design for perceptive qualities in objects. Next to PeR we have been working on a second research design PeP, short for perception pillar. This installation is specifically designed for research purposes. The integration of the theoretical notions in design is more closely investigated. Next to functioning as a platform for the design of perceptive qualities PeR also adds value in building relations between the textile industry, high tech industry and design. The current prototype of PeR is handmade but the used techniques allow for some parts to be manufactured by means of existing production techniques like tufting and weaving. Creating PeR by means of these manufacturing techniques also would improve the quality of the prototype. This is necessary for PeR to really function as a platform for design. Our research will benefit from a solid and easily accessible prototype.

References