Abstract

Herzfassen is a self-contained kinetic object that uses physical computing and biometric data to provide a highly aesthetic and sensual experience while still having the outer appearance of an ordinary everyday object. A metal bowl filled with water visualizes the human heartbeat through vibration and according patterns in the water surface. The title Herzfassen derives from the german expression for 'to take heart' thus hints to the haptic and emotional experience with the object.

This paper describes aim and design of the piece, comprising construction, technical function, as well as the interaction cycle respectively the object's dramaturgy. Further, it reports on audience's joyful and emotional experiences with the object within past exhibitions as display and use hence human contact is the main purpose of Herzfassen.

Keywords
Interaction design; awareness design; design and emotion; information aesthetics; physical computing

ACM Classification Keywords
H.5.2 [Information Interfaces and Presentation]: User Interfaces - Haptic I/O

General Terms
Design, Human Factors
Figure 1, 2. *Herzfassen* in use. When holding both handles, the heartbeat information is transferred into water movement.

**Intention**
The concern with *Herzfassen* was to use interaction design as a momentum against the phenomena of so-called alienation [3], an actuality familiar to the labour- and achievement-oriented society, characterized by disturbed and/or estranged relationships between man and world (subjects and objects) [5]. The aim was to design a responsive, cherish-able object that facilitates sensual experiences and invites people to explore and interact. The object itself, one's own feelings and relationships towards the object-like world, as well as towards other people (when sharing the experience) can be explored. The experience outcome should be a friendly 'one with the world' feeling, similar to Csikszentmihalyie's idea of 'flow' [1].

**Design**
The final design of the kinetic object retained the outer appearance of an ordinary everyday item. The object is fully self-contained with no need for external cables, power-supply or sensors. This seamless design is highly important and a crucial premise for the equally seamless aesthetic experience.

**Construction**
*Herzfassen* consists of two separate metal bowls placed into one another. It was crucial to find two perfectly matching bowls with the same diameter but significantly different heights, so placing them into one another a 'hidden space' emerges between them (see fig. 3). This relatively small space contains all necessary electronics (see fig. 4), invisible from the outside when the inner bowl is placed inside the outer one. Custom-made handles are attached to the outer bowl to indicate haptic interaction and to function as sensors for measuring the heartbeat. Lastly a vibration element (a 'bass-shaker', usually mounted under car seats to amplify low frequencies in music through vibration) is mounted underneath the inner vessel.
Function
The conductive handles operate as capacitive sensors measuring skin resistance. Both handles need to be touched for a closed circuit and for measurement. Once an average value over approx. 10 seconds is measured, the built-in micro-controller calculates an approximate heartbeat rate. This process is similar to modern gym cardio training equipment like 'cross-trainers' that measure the heartbeat rate via conductive plates in the handles. Regarding accuracy Herzfassen cannot compete with mass-produced equipment. This is a deliberate design decision, the inaccuracy is accepted for experiential reasons. Professional more precise equipment (like an external off-the-shelf heart rate finger-clip) would diminish the intuitive, emotional experience significantly.

The determined heartbeat rate is sent out as an audio signal from the micro-controller to the bass shaker. The bass shaker does not produce audible sound but vibration that sets the inner vessel and the water in it in motion thus produces the heartbeat visualization in the water surface.

Interaction
The object suggests interaction through its design [4]: the handles and also the title are intuitive, but still ambiguous invitations to physical interaction. The ambiguity in this case adds to the explorative experience [2] of 'getting to know the object'. People intuitively start touching the bowl. At first rather shyly: touching only one handle nothing happens. Touching both handles, the water starts moving. If the person shies away, the water calms down again right away. To 'hand over' one's heartbeat to the bowl, it needs firm physical contact for a few seconds. This is designed that way to feel like the object needs more than just a 'poke' to work. It also provides the timeframe for the micro-controller to measure and calculate the heartbeat. During this time there is constant water movement, creating ripples and patterns. After that the heartbeat is 'locked in', the water starts pulsating in the

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**Figure 3.** Schematic section: inner and outer vessel

**Figure 4.** Self-contained electronic inner-life of the bowl.
**A:** on/off switch  **B:** micro-controller  **C:** rechargeable battery packs  **D:** charging cable and plug for battery charger  **E:** pieces of rubber tube to damp vibration and reduce noise
according rhythm. The information is now stored and the person can let go of the handles. The water keeps ‘beating’ for approx. one minute while the pulsation slowly abates until the water is calm again. The bowl can also be touched by another person while it is still ‘beating’. One then ‘over-rides’ the current heartbeat which is a crucial and very intimate moment: literally touching another person’s heart.

**Audience experiences**

Audience feedback throughout has been very positive. The straightforward, easy and intuitive interaction made the piece instantly accessible for everyone and people explored and engaged enthusiastically. Some were interested in the technical aspects and explored it for that reason, others ignored the technical side and took the bowl for an ordinary object, which made the experience even stronger. Some even looked under the table to see how the ‘magic trick’ works. Once the logic is understood, people start playing with it: groups tend to circle around the bowl holding hands while only two of them are touching the bowl (fig. 5). This obviously distorts the information, but instead is a strong social experience – creating a ‘common’ heartbeat. People also tried to change the results in various ways, motivated by suspicion, curiosity or playfulness. I saw people doing rounds, push-ups or knee-bends to change their heart rate and therefore change the visual effect on the water surface. All in all, a certain individual or social dynamic around the object emerges, which I like to call ‘magical aura’.

The aim to create responsive experiences through design and technology was met. With *Herzfassen*, highly poetic, intimate or social experiences can be provided through a designed object.

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Online documentation: monikahoinkis.de/herzfassen

**References**