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What have artists ever done for UbiComp?

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What have artists ever done for UbiComp?
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REG: They've bled us white, the bastards. They've taken everything we had, and not just from us, from our fathers, and from our fathers' fathers.
LORETTA: And from our fathers' fathers' fathers.
REG: Yeah.
LORETTA: And from our fathers' fathers' fathers' fathers.
REG: Yeah. All right, Stan. Don't labour the point. And what have they ever given us in return?
XERXES: The aqueduct?
The Life of Brian, 1979.

Introduction
Many artists have appropriated ubiquitous technologies for aesthetic purposes, but what have they ever done for UbiComp? To answer this question we focus on two art projects that use ubiquitous technologies to augment and extend the body: Rokeby's *Very Nervous System* [2,4]; and Wilde's *hipDisk* [5]. In both projects the artists constructed novel technical solutions. In order to achieve real-time movement analysis, Rokeby constructed three cameras out of arrays of light dependent resistors and Fresnel lenses and analysed each image in parallel using a dedicated processor programmed in assembly language. In three weeks, Wilde rapidly prototyped a new wearable musical interface using conductive materials to detect points of contact between two discs attached above and below her waist, which in turn generate sounds via a microcontroller. Although the technical achievements of these projects are impressive, we argue that it is the design process that underlies them that is the most significant contribution to UbiComp. Both artists employ a playful, poetic approach to design that is distinct from that typically adopted in academic and industrial research environments. Gaver [1, p.4] has argued that, "scientific approaches to design need to be complemented by more subjective, idiosyncratic ones. It is difficult to conceive of a task analysis for goofing around, or to think of exploration as a problem to be solved, or to determine usability requirements for systems meant to spark new perceptions." We argue that the particular contribution that artists can make to UbiComp is to provide idiosyncratic, complementary approaches to scientific design. It is important to note that we do not claim that our argument applies to all artists because, like scientists, they constitute a large, heterogeneous group. Certainly, artists could play a representational role in UbiComp projects, for example, recording stages of the design process. However, our argument applies to artists whose work "is less involved in knowledge and more involved in experience – in pushing the boundaries of what can be experienced." [3, p.52].

Very Nervous System (1982 – 1995)
This is a series of interactive sound installations developed over a period of more than a decade by David Rokeby. Three cameras are placed in a triangle around an empty space. When a user moves within the space, the dynamics of their movements (for example, the relative intensity and suddenness) trigger different parts of a music piece. A funk composition might consist of an electric guitar, an acoustic guitar, a bass, drums, and a brass section, each sound generated via MIDI. The basic behaviour of each instrument is to a large extent predefined, for example, whether it tends to play on beats or offbeats, but this behaviour can change depending on a user's movements, for example the rhythm might double. The user, the software and Rokeby all contribute to the heard music. Rokeby's poetic aim was to give people an experience of space as "a medium in itself" with a tight coupling between their movements and the generated sounds evoking a sensation of swimming or moving through jello [2]. Like *hipDisk* there is both humour

too in the work and a desire to facilitate people to move in extended, non-habitual ways: "In one piece there was a sound you could only find if you walked as though you were carrying a 40 pound weight"[4].

hipDisk (2007)
This wearable instrument was inspired by artist Danielle Wilde's experience of how her hips rotated while she was swimming. User's play it by moving and tilting their hips and torso well beyond their normal range so that two polypropylene discs (approximately 3' in diameter) contact and a circuit is completed which triggers an "electronically primitive, harsh and reedy" microcontroller-generated tone [5, p.19]. There are 12 contact points around the discs enabling users to play a chromatic scale (with middle C in front of them and frequencies decreasing clock wise) and pick out simple tunes. The front 4 tones are easy to trigger but the other 8, especially the rear ones, are very difficult to play and force a user into bizarre poses. Even though she has a background in physical performance, w hen she initially saw video footage of a performance Wilde was shocked at how *hipDisk* led her body into very unconstrained and exposed postures. However, while performing she continually smiles because of the pleasurably immersive experience of using the instrument. Audiences always find the performances funny, even hysterical. This is partly because Wilde wears a swimsuit and swimming hat in recognition of the inspiration behind the device, and the fact that extreme, unconstrained movements result in rather underwhelming sounds being produced (think Rolf Harris playing the Stylophone). One unexpected benefit of the device is a thorough core-body workout for the user.

Conclusion
We argue that in assessing what artists have done (and can do) for UbiComp, our focus should not be on their potential to construct technological solutions to particular problems (although some creative practitioners are technically highly skilled). Rather, the particular contribution that artists can make is to provide a playful approach to design that can result in exploring regions of 'design space' that are not typically visited by conventional scientific or commercial research. Artists might not build aqueducts, but their exploratory design process has the potential to generate the initial concept of using bridges to carry water. This is a significant contribution to UbiComp and we're looking forward to collaborating with Danielle Wilde on our e-sense project in 2009.

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