Bio Circuit

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Abstract
In this paper we describe Bio Circuit, an artist and designer collaborative wearable project. This project stems from our concern for ethical design and the creation of media-based interactions that reveal human interdependence with the environment.

Keywords
Wearable computing, sensors, heart rate, audio, art, design, soft products, collaboration, environment, body

ACM Classification Keywords
J. Computer Applications, J.5 ARTS AND HUMANITIES, Subjects: Fine arts

General Terms
Design, Human Factors

Introduction
Bio Circuit explores the interrelations of humans and the environment through wearable computing. This project was developed through an art and design collaboration at the Emily Carr University of Art and Design, Wearable and Interactive Products Lab. Bio Circuit is a vest that uses wearable computing to create an audible connection between the wearer’s heart rate and the environment.

Description
Bio Circuit is a wool vest worn over a person’s clothing. The wearer has to first fasten on a heart rate monitor
that rests against the skin and close to the heart. The monitor sends the wearer’s heart rate at regular intervals to a Polar Heart Rate Monitor Interface designed by Danjuliodesigns with Spark Fun. The heart rate data is relayed to the Arduino Lily Pad, which triggers an MP3 audio player to play the audio track related to that specific heart rate. A speaker is embedded in the collar next to left ear making it possible for the wearer to hear both the audio track and the sounds of their surrounding environment.

The audio tracks are soundscapes mixed from a range of ambient sounds. If the wearer’s heart rate is low than the soundscape will reflect a quiet natural area with sounds such as water, birds and insects. If the wearer has a high heart rate then they will hear a cacophony of urban sounds such as people talking and traffic.

Aesthetic Considerations
Our aim was to design a garment that is striking but not exaggerated or theatrical in appearance. We wanted the wearer to feel that they were engaged in an intimate, rather than a performative, experience. The white wool presents a smooth refined surface that contrasts the intense heat of the orange lining. In the sunlight it is possible to see the orange lining through the woolen exterior creating a visual reference to the interior warmth of the body and the permeable exterior of the skin.

The circulatory system of the body is reflected in the detailing of the garment. The orange cords show the path of the circulatory system, which connects the heart to the head while also revealing the path of the heart rate monitor to the speaker.

Conceptual Framework
Bio Circuit stems from our concern for ethical design and the creation of media-based interactions that reveal human interdependence with the environment. With each beat of the heart, Bio Circuit connects the wearer with the inner workings of their body. In this sense the garment functions like other biofeedback devices that use sensors to provide a person with information about their physiological state. With Bio Circuit, we are proposing that these kinds of devices could extend a person’s awareness to include the environment.

Next Steps
Bio Circuit is the first iteration of this concept and we have a keen interest in further developing this collaborative project. Our next iteration will involve developing the technical capabilities of the garment, making it possible to sample sounds directly from the immediate environment of the wearer.

Conclusion
Based on our initial explorations with Bio Circuit we’ve discovered a growing interest in ethical garments that respond to environmental concerns. More development work needs to be accomplished but the initial findings are quite promising.

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