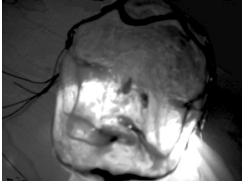# *whisper:*

wearable body architectures

Submission to Workshop on Physiological Computing at CHI 2002
Thecla Schiphorst , Susan Kozel, Andruid Kerne

wearable | handheld | intimate | secret | personal | expectant | response | system
wireless | heuristic | invisible | sensory | private | environmental | reproducing | system

networked | wireless | computer interactive | telepathy
video | audio | physical response| invisible | desire
installation | performance| mapping | unearthing

This submission for the workshop on Physiological Computing at CHI2002 describes research for a new media work entitled whisper: wearable body architectures. *whisper* is based on small wearable devices and handheld technologies that measure physiological data in a networked environment. *whisper[s]* are wearable body architectures. The *whisper* project takes place both in an installation space and on the web.

Participants enter a space, which can best be described as a networked ecosystem containing small intelligent devices, which emanate their state, based on the wearer's movement and intention. At one end of the space is a projection screen upon which the collective interactions, the 'body' of the system state is projected and displayed. Participants move and browse through the space with access to a set of devices which are sewn into clothing such as a jacket, hat, cape, or belt, be hanging from the grid above, or may be on the floor calling to be picked up. Whisper devices are networked to a central server which accesses a database and constructs the system-state visualization transmitted both to the projection surface in the space, and to the web. *whisper* devices create their narratives based on the interaction body they presently inhabit, and their own past lives.

Network DB
Server

Dev1

Agent2

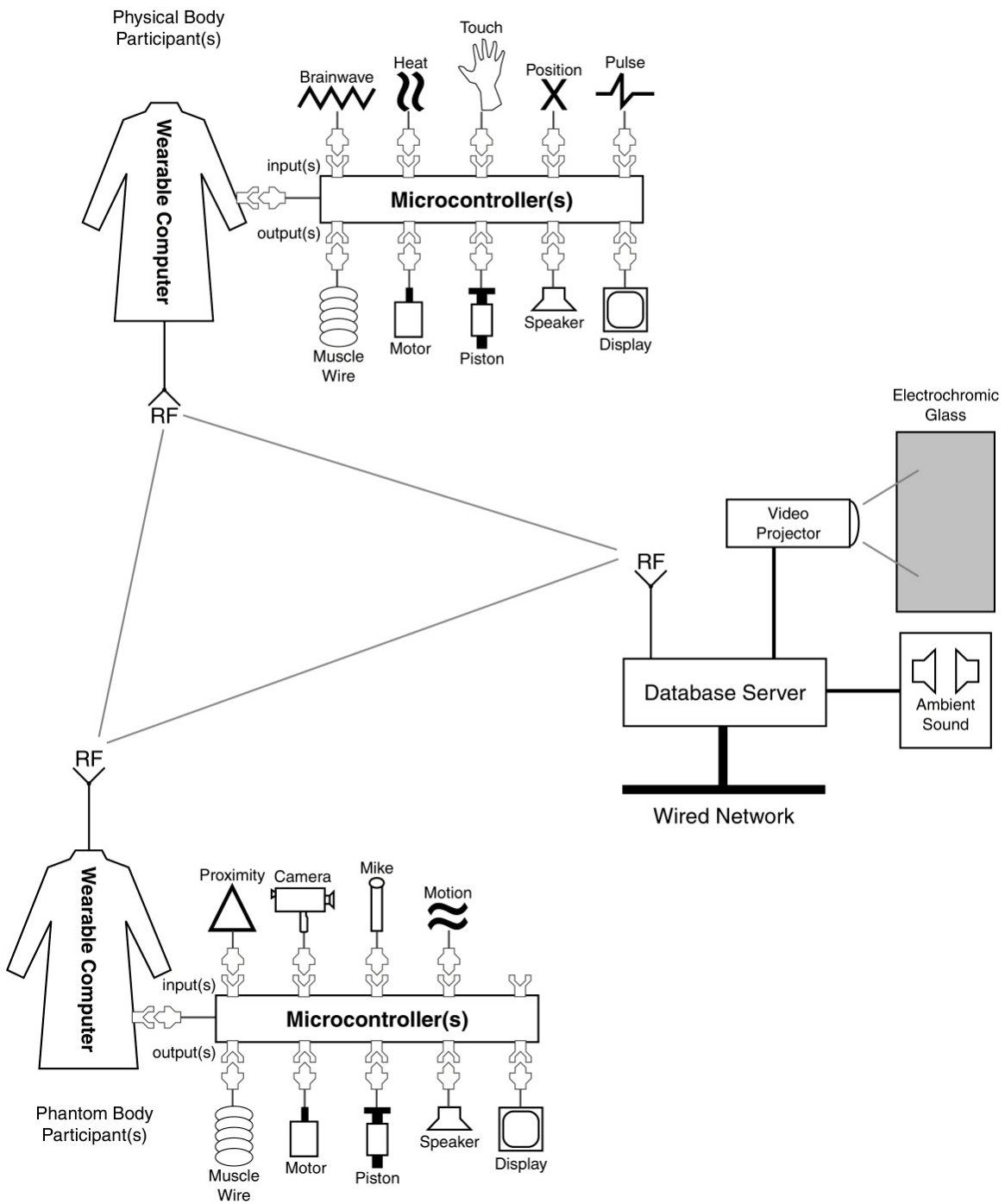Dev2

Dev3

Agent3

Agent1

Dev4

Dev5
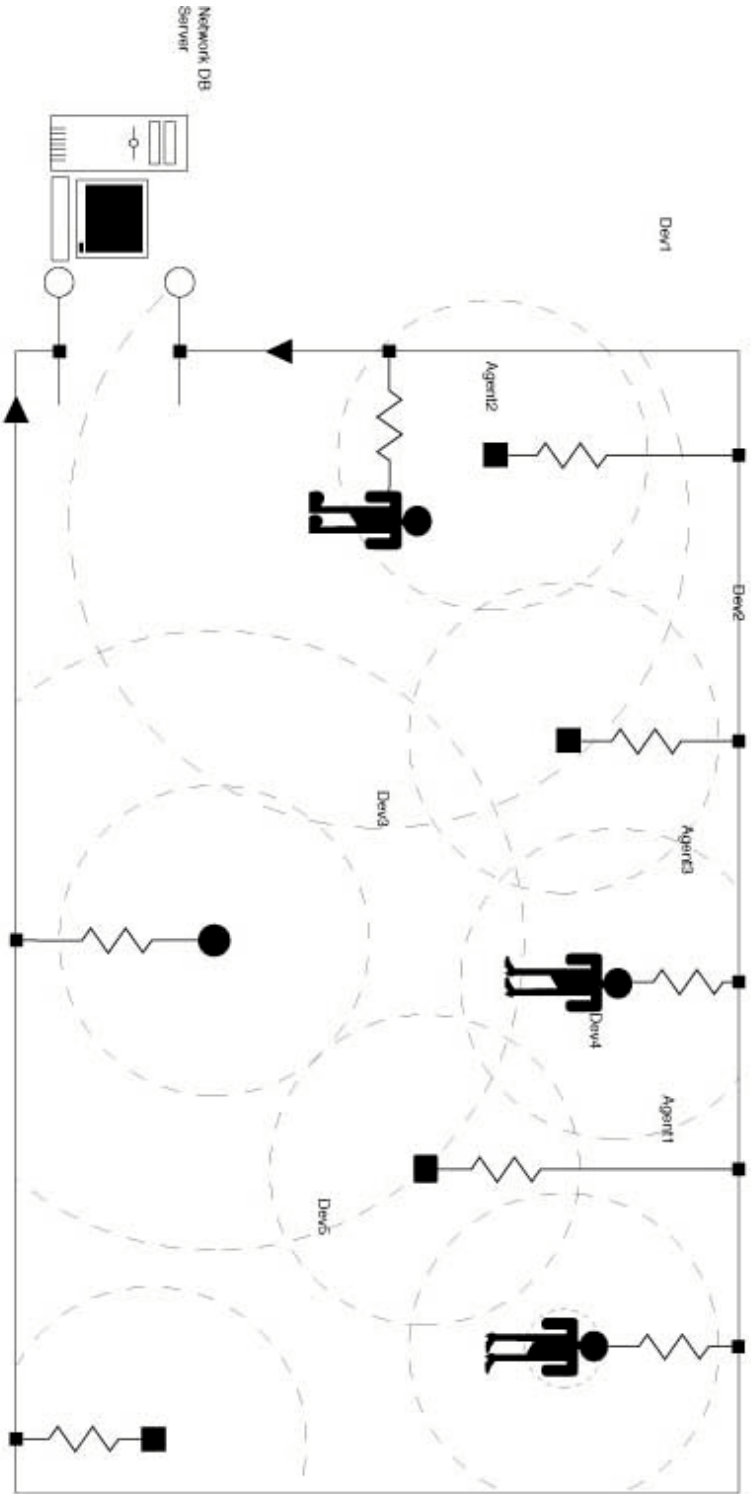
whisper utilizes wearable computers and wireless computer communication, builds upon physical practices such as dance improvisation, and manifests cultural and scientific theories of embodiment. The technology and the physical vocabularies are to be developed synchronously. *whisper* is a participatory installation which generates and represents data flows in intimate connection with the bodies that produce and alter them. *whisper* unearths physical data patterns of the body, mapping that data onto linked and networked devices worn close to the surface of the skin. It appropriates the attention, the breath, the heartbeat of a community of performers and audience members, rewriting them as shared signals on the network. *whisper* borrows from biofeedback techniques to shift our attention back to the intimacy of the autonomic self. This piece uses wearable devices like displays, miniature speakers, matchbox webservers, and small vibrating motors and mechanisms.

physiologically based input – wearing the body

The devices track and trace each other while worn and carried between bodies, receiving input from physical body signals, processing data through a collection of networked devices, and outputting a range of mapped responses back onto other bodies participating in the installation. Devices whisper to each other, tracking undertones, secrets and their own intelligences onto the bodies that carry and wear them. The devices together create an intelligence, and communicate to other devices in close ecological proximity. Communication is not always overt, often covert, while device responses build up a certain threshold and then express connectivity by using its own physical properties [such as motor movement, speaker sound, small display flicker]. Bodies in the space become 'device carriers', and as their movement shifts, the devices respond and shift with the movement of the 'carrier bodies'.

A range of physiologically based input signals will be explored: breath, pulse, brainwave patterns, electrical energy, temperature. For this participatory installation, collections of wearable devices will be networked together, between bodies, or traversing a single body. The network transmits and communicates when devices are in close proximity to one another, sharing data signals between physical bodies that wear them.

Physical Body
Participant(s)

Brainwave Heat Touch Position Pulse

Wearable Computer

input(s)

Microcontroller(s)

output(s)

Muscle
Wire Motor Piston Speaker Display

RF

RF

Electrochromic
Glass

Video
Projector

Database Server

Ambient
Sound

Wired Network

RF

Wearable Computer

Proximity Camera Mike Motion

input(s)

Microcontroller(s)

output(s)

Phantom Body
Participant(s)

Muscle
Wire Motor Piston Speaker Display

Both the input and output components are worn close to the skin, on clothing, around the neck, wrist, or ankles, like jewelry, attached to a piercing, next to the heart, or on one's sleeve. Through the use of small motors and sensors, the components can output vibrations, temperature changes, sound, light and color, or miniature textual or image, even low-bandwidth video displays.

A wearer may configure their plugout device(s) to vibrate, tickle, or sigh when it receives data associated with a particular pattern set. Maximum configurability is accomplished by 'plugging in' components, by mixing and matching functions within this modular system. *whisper* extrapolates from the body onto the larger collection of networked bodies: effectively a performance piece in a social space.

emanating relationship

In *whisper* the interaction is based on creating and emanating relationship between the small devices through subtle communication or exchange. Each *whisper* device emanates their state to the other whisper devices that are within range. The receiving whisper perceives and incorporates the state space of the other[s]. The state of the whisper device is a direct function of the body that wears it, along with the memory and future memory. The Oxford dictionary defines *emanation* as an abstract but perceptible thing that issues or originates from a source. Emanation implies a sender [source; originator] and a receiver [of the abstract and perceptible thing], and suggests outgoing and incoming signals.

Each device has a *whisper* device-state, and the collection of devices defines the current global whispers system-state. Device states emanate from or are whispered to other devices within proximity of the range of influence. *whisper* devices also 'perceive' these emanations based on their current state, and alter their own state, based on incoming perceptions. *whisper* device states are learned and emerge from living on a specific body, and begin to represent that body. The whisper devices also remember past bodies and states, and these past lives influence their behavior.

whisper plays in an ironic way with domains of influence, visibility, and the shifting threshold between the tangible and intangible. The continuum that spans the range between intangible and tangible is a threshold of perception. *whisper* shifts our attention to this mobile threshold.

body as system

Each device in whisper is held close to, or worn on the body. Our body as system creates a metaphor for the operating model of *whisper*. Our bodies are composed of multiple networked systems, which communicate autonomically to and with each other. So do the devices in whisper. Our

bodies are shaped with multiple thresholds that operate in stealth at one moment, overtly at the next moment. These thresholds lie at the liminal boundary of our perception. Our bodies are fluid, networked, and dynamic. Our bodies have secrets, contain multiple intelligences, conceal information in unlikely places, and develop strategies for the expression of current and archived states. So do the devices of whisper. Our bodies surrender things to one another. Our bodies learn, habituate and unlearn by applying directed attention. So does whisper. Any one of our bodies is a 'we'. When our bodies are together they can operate as an 'I'. So can the devices in whisper.

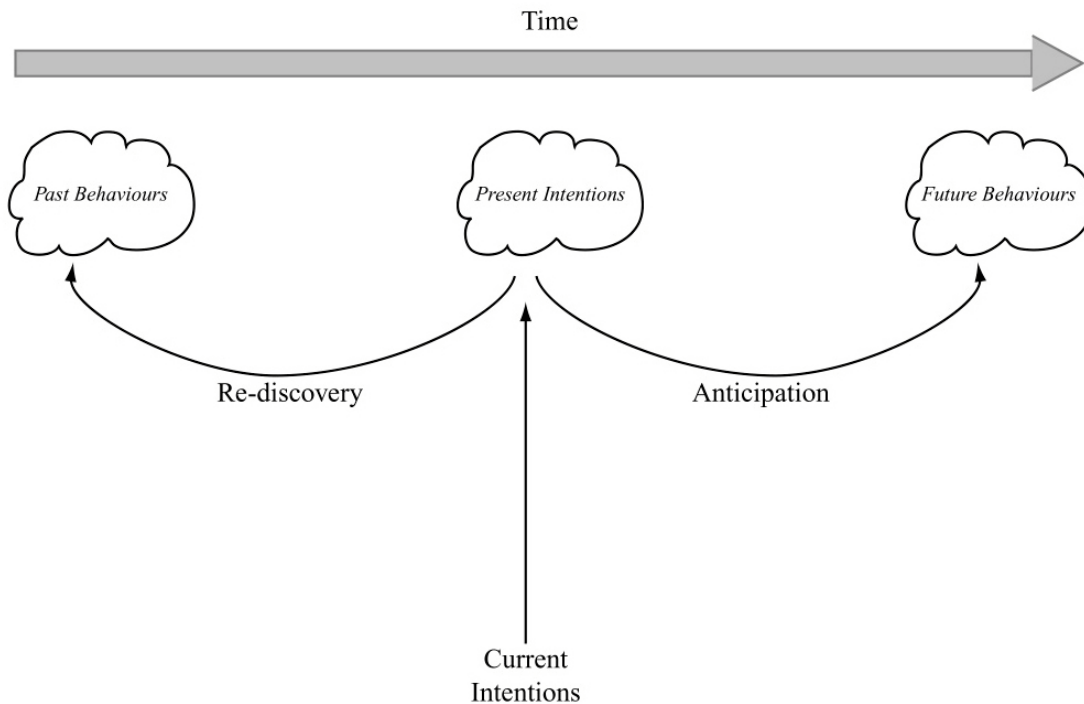## cultural study of telepathy and mapping

whisper is a foray into the cultural study of telepathy and of mapping techniques: impressions are transferred invisibly, mediated both through body and technology. The research process explores invisible datastreams as wireless networks and suggests, both playfully and literally, that telepathy is the ultimate wireless network. *whisper* builds wearables for the telepathically impaired: as 'aware-able' devices, they make bring to awareness functions of embodiment and perception that were previously ignored.

The concept of mapping as unearthing knowledge is critical to the design of this research and is related to the 'aware-able' device. Mapping is a technique that can help to reveal or define underlying patterns of processes and information. Mapping offers a new view on an idea, a process, an event, an object or a place. Maps provide a means of visualization that might unearth patterns within one of these views. Mapping is a discovery: it may reveal new knowledge within an area thought previously to be known, or it may help in the acquisition of knowledge or experience of what is not known. Rediscovery within known areas is often achieved by combining views which might, at first seem irrelevant to each other, like mapping processes that are not normally regarded as important. Mapping is a dynamic and constant unearthing of information. Other artists such as Knowbotic Research have mapped data from city spaces and represented that data in ways which reveal interconnections. This research will map data signals from collected and networked bodies, using sensors that collect physiological data. This reflects the awareness that our bodies are subtly evolving maps of our identities and our lives. *whisper* excavates the invisible, is a search for lost things.

future memory

whisper works with the concept of a memory map that traces a path along which navigation occurs, but also extrapolates that path into the future.

In *whisper*, this concept of future memory is represented through the dynamic visualization of its own system state. *whisper* maintains and displays a dynamic representation of its memories.

Time

Past Behaviours   Present Intentions   Future Behaviours

Re-discovery   Anticipation

Current
Intentions

In particular the system view represents and builds *future memory*: which is the computational equivalent of precognition, electronically augmented telepathy. The whisper devices and participants, through their behaviors anticipate potential future behaviors and state. The state flows from the past to the future; the intentions are always dynamic, as velocities and accelerations of behavior. As the whisper system evolves over time, it will be able to re-visit its past decisions, in the light of current intentions, and recover past potentials obscured by the initial instantiation of behavior at that time. Not everything can be known at the point of its initial enactment; the past is incomplete and the whispers can revisit and reconstruct past views as it progresses. The past is not replaced, it is augmented and restructured as the system perception grows. And the rediscovery of the past propagates into the future and the system's anticipated behaviors.

In whisper, communication is characterized by its context: whispers can be *qualified* [in contrast to quantified]. Qualified communication deals with intent: gesture, tone, pitch, repetition, redundancies: are all qualified elements of communication because they provide *context*.

Project Participants

Primary Contact:
Thecla Schiphorst
Associate Professor
Interactive Arts
Technical University of British Columbia
Vancouver BC Canada
Telephone 604 586 5279
Email schiphorst@techbc.ca

Susan Kozel
Assistant Professor
Interactive Arts
Technical University of British Columbia
Vancouver BC Canada
Email kozel@techbc.ca

Andruid Kerne, PHD
NYU Computing Science
Media Artist, CreatingMedia
New York, New York
Email andruid@creatingmedia.com