

WEARABLE ENVIRONMENTS

Abstract

To explore the varieties of human agency, particularly shared agency, we propose an approach to developing "wearable environments" using a unified model of agency as a guide. Wearable environments combine wearable computing and smart environment approaches to ubiquitous computing together. Our research focuses on human experiences

within wearable environments to experiment with different physical configurations between humans and technological agents. The model of agency presented here combines a gradual model of agency with a model of creative engagement and provides a solid reference for the assessment of human agency in performance-based case studies. We are particularly interested in the expressive dimension of our agency originated from bodily gestures.

RESEARCH
CONTEXT

Wearable Computing

- > Computing placed onto the body
- > Mobile information and control
- > Proximate interaction
- > Personalized user interface (for a single person)

Smart Environments

- > Computing embedded into the environment
- > Localized information and control
- > Remote interaction
- > Generic user interface (for multiple people)

Agency

- > The capacity or potential for action (Suchman, 2006).
- > The ability and need to act (Kaptelinin and Nardi, 2006)
- > Two main views: symmetrical or asymmetrical.
 - . Symmetrical view: no difference between human and non-human agents
 - . Asymmetrical view: humans differentiated from non-humans by having intentionality

APPROACH &
METHODOLOGY

Performance Perspective (Jacucci, 2006)

General interaction design tenets
Task, timeless, universal, general
Usability, accountability
Users, administrators, consumers
Measuring, simulating space

Performance perspective
Event, contingent, ephemeral, unique
Expression
Performers, directors, participants
Configuring, performing space

Critical Reflective Design (Sengers, 2005)

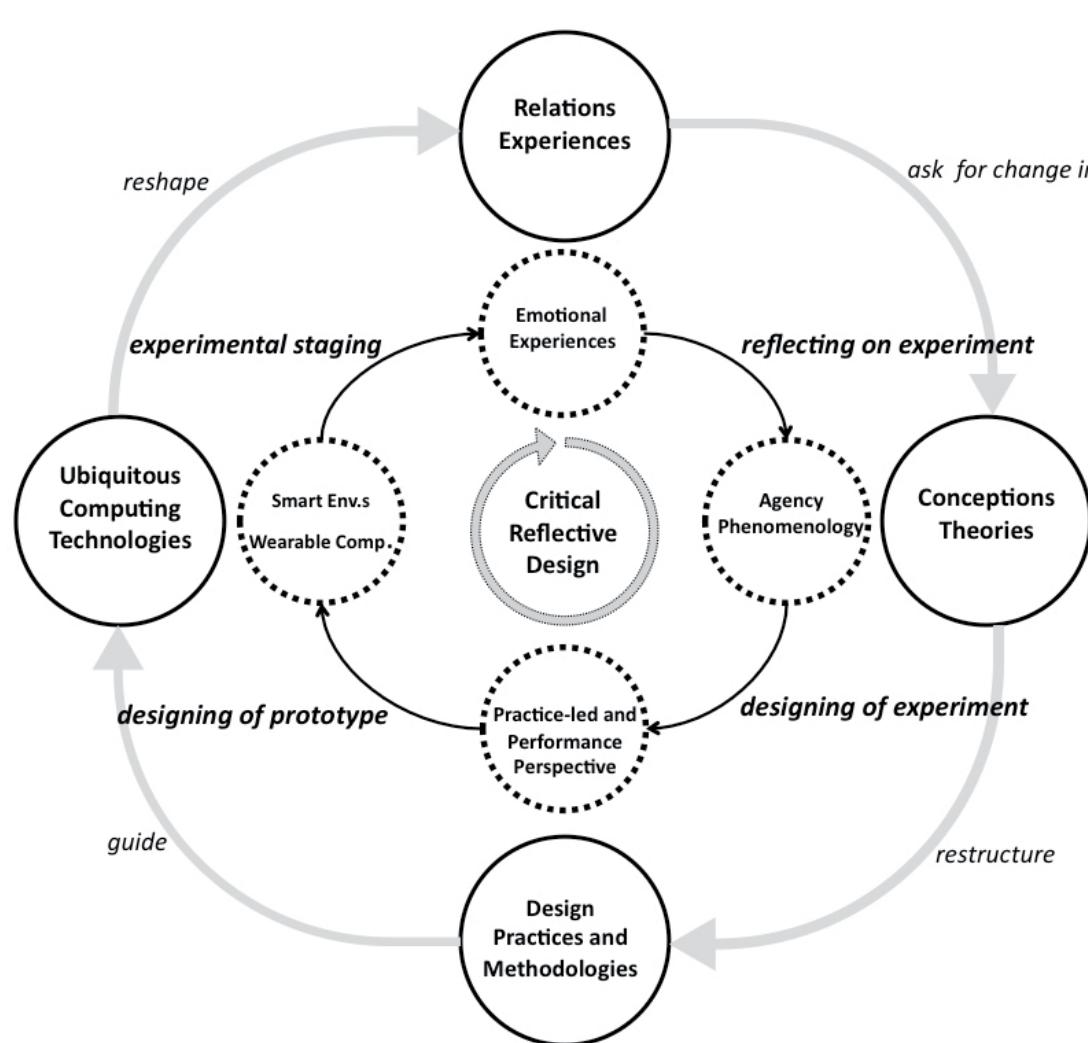
Design
systems that accurately acquire, represent and reason about human activity

systems that respond evocatively to human activity, providing new opportunities for users to have, interpret and reflect on their own experiences

Evaluation
measuring how accurately systems can track and communicate human activity

how design choices support certain kinds of interpretations and experiences in real-world contexts

Research Cycle



A Unified Model of Agency

A gradual model of agency (Rammert, 2008)

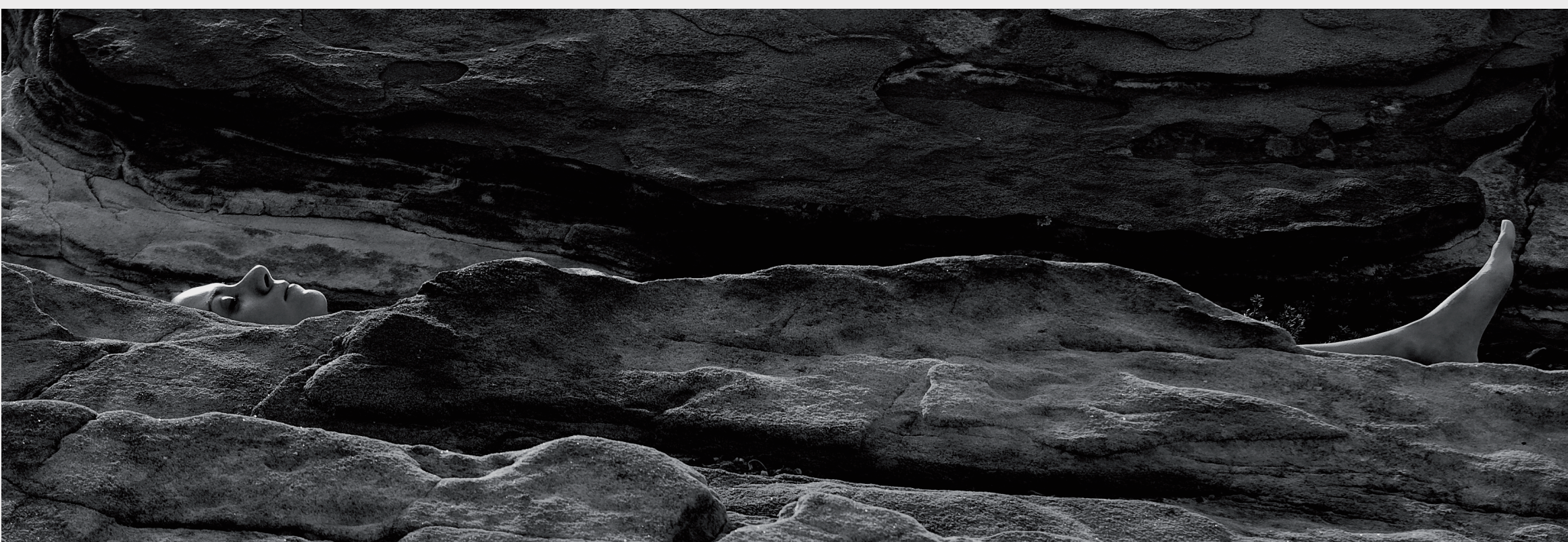
Levels	Low	High
L3: Intentionality	From ascription of simple dispositions	Up to guidance by complex semantics
L2: Contingency	From selection of pre-selected options	Up to self-generation of actions
L1: Causality	From short time irritation	Up to permanent restructuring of action

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A model of creative engagement (Bilda et al, 2008)

- Five modes of interactions:
1. Unintended mode
 2. Deliberate mode
 3. Intended/in control mode
 4. Intended/uncertain mode
 5. Unexpected mode

PRELIMINARY
CASE STUDY



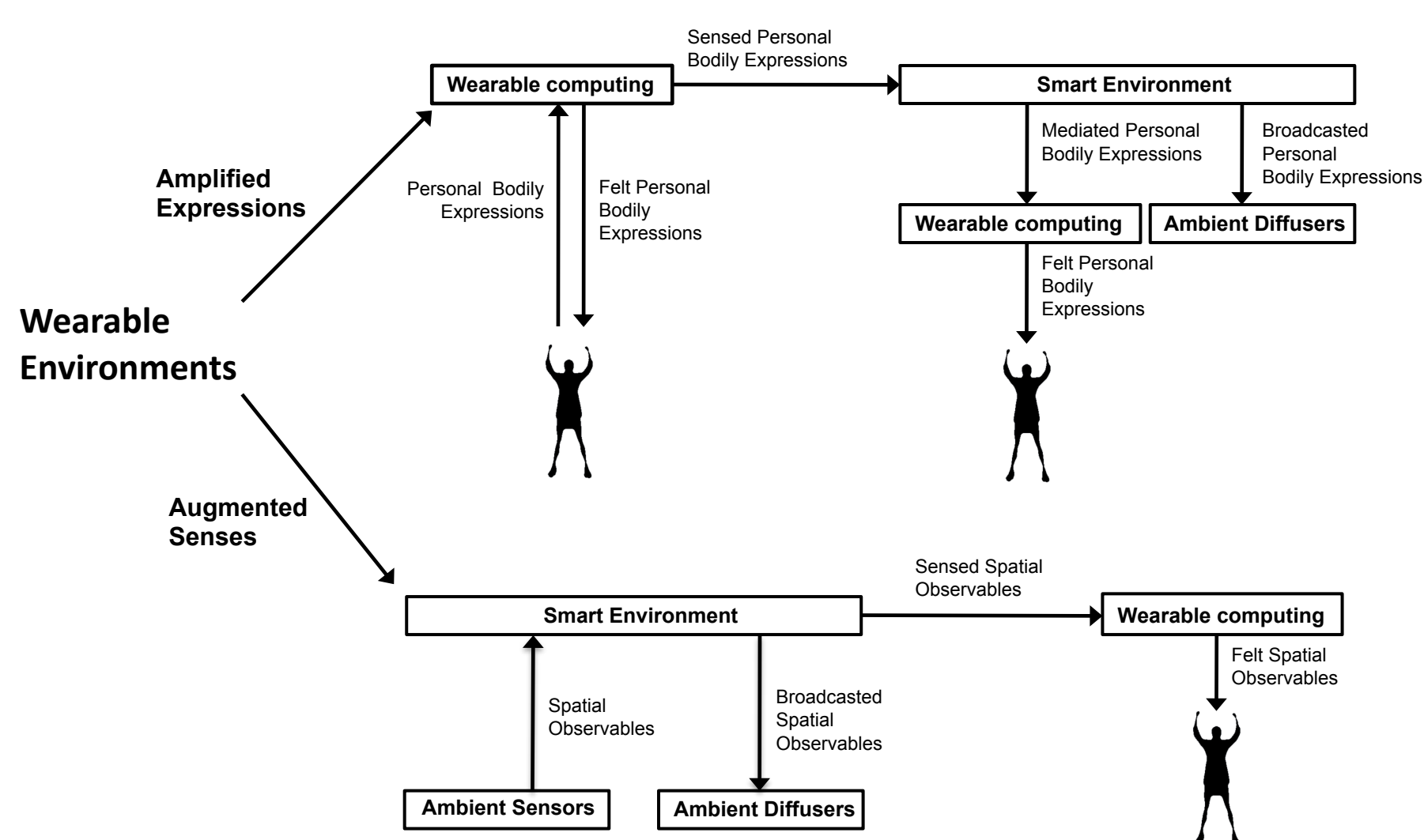
> Performative use of photo-media as way of conceptual inquiry and as a way to bring third person perspective to interaction scenario.

> Importance of the shared agency: combining agency between humans and technological agents.

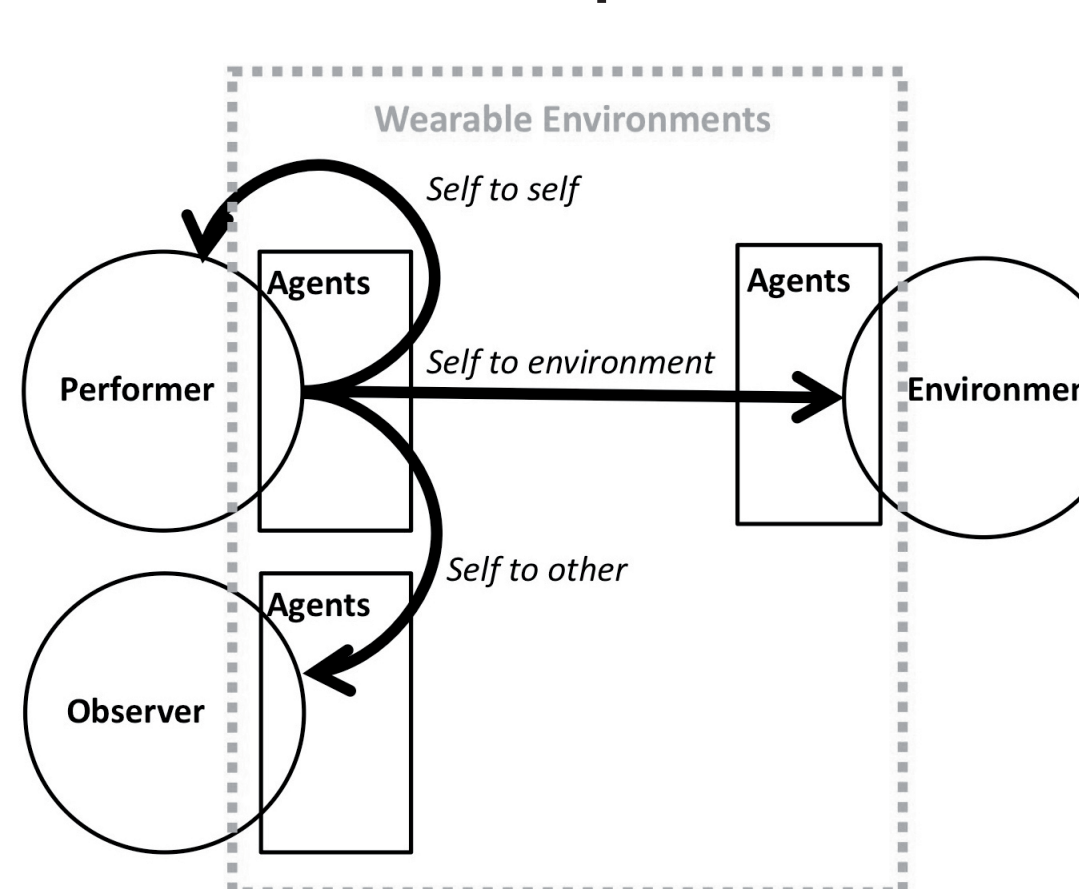
> The idea of wearable environments
> Importance of multiple points of views

FUTURE CASE
STUDIES

Wearable Environment Model



Directions of Expression



Configurations of Case Studies

Actuating/Diffusing Agents	Negotiation Mode 1				Negotiation Mode 2			
	System's Agency Level 1		System's Agency Level 2		System's Agency Level 1		System's Agency Level 2	
	Sensing Agents	Effecting Agents	Sensing Agents	Effecting Agents	Sensing Agents	Effecting Agents	Sensing Agents	Effecting Agents
Proximate	1	2	5	6	1	2	5	6
Distant	3	4	7	8	3	4	7	8
	Case Study 1				Case Study 2			

- > two types of interface agents: sensing and effecting
- > two modes of integration: proximate and distant
- > two levels of system's agency
- > two modes of negotiation

The numbers in each uncoloured rectangle box, that is, experiment sessions, denote a particular configuration between the human and non-human agents. For instance, #1 corresponds a configuration in which both sensing and effecting agents are placed on the body as wearables with level 1 system agency.

EXPECTED
OUTCOMES

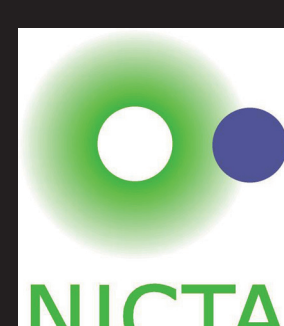
- > A tested working prototype of wearable environments
- > Ways to enable shared agency in wearable environments
- > A refined model of agency for smart environments and wearable computing
- > Negotiation protocols between human and technological agents to facilitate creative engagement.
- > Identification of design concerns and principles for designing for human experience from a performance perspective

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The University of Sydney
Faculty of Architecture, Design and Planning



Australia's ICT Research
Centre of Excellence

Author: A. Baki Kocaballi
 Email: abakik@arch.usyd.edu.au
 Supervisors: Rob Saunders
 Petra Gemeinboeck
 Markus Rittenbruch
 Masahiro Takatsuka