

# Wearability in Wearable Computers

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## Abstract

*Wearability, or the relationship between a worn technology and the ability or desire of the user to wear it, is a key element in the successful design of wearable technologies. Wearability addresses the physical, cognitive, and emotional state of the user, and the impact of the wearable technology on the user's homeostasis in each area. This tutorial will provide the participant with an overview of the pertinent variables and design considerations for the design of truly wearable technologies. We will address factors related to anatomy, ergonomics, cognitive science, psychology, sociology, textile science, interface design, and apparel design.*

## 1. Topical Outline

1. Human Anatomy and Physiology
  - (a) Anatomy
    - i. Bones, muscles, joints, nerves
    - ii. Working position and ergonomics
      - fit and garment design
    - iii. Interaction: sight, reach, dexterity
  - (b) Physiology
    - i. Skin and sensation
      - variables in touch and comfort
      - sensitivity over the body surface
    - ii. Sensing the body
      - useful things to sense and how we sense them
      - impact of wearability on signal-to-noise ratio
    - a. electro-dermal sensors b. inertial sensors
    - iii. Dissipation of heat and moisture
      - intro to textiles fiber, fabric, finish
2. Psychology and Cognition
  - (a) Attention
    - i. Cognitive load and attentional demands
    - ii. Simultaneous processing
  - (b) Memory and recall
    - i. Memory aides and patterns of data storage/retrieval
    - ii. Subliminal cueing

- (c) Body Adornment
  - i. dress and identity: individual and group identity
  - ii. History: Aesthetic and Functional adornment
3. Sociology
  - (a) Electronic networking and communication
  - (b) The user/non-user divide
  - (c) Social construction of technology
  - (d) Non-verbal communication
4. Acceptance of Innovation
  - (a) Bell curve of user acceptance
  - (b) Evolution vs. Revolution
  - (c) Needs vs. Wants
  - (d) Personal space, identity, and wearables
5. Wearability exercise
  - (a) Design, build, wear a blue-foam sleeve
  - (b) Inspired by a worn object
  - (c) With a specific function and interaction
  - (d) For the duration of the conference.

## 2. Intended Audience

The tutorial is geared toward novices in wearability study, including other specialists in other sub-fields of wearable technology research and design, as well as newcomers to the field. There is no pre-requisite knowledge for the course: due to time constraints, an overview approach will be taken, with the goal of exposing the participant to the breadth of issues to be explored in human-centered wearable technology design. The tutorial will conclude with a hands-on design activity in which the concepts discussed will be applied.

## 3. Biography

Dr. Lucy Dunne is Assistant Professor of Apparel Design and Wearable Technology in the University of Minnesota's School of Design. She holds a PhD in Computer Science from University College Dublin, and a BS and MA from Cornell University in Apparel Design. She has worked in fashion design, functional apparel design, and wearable technology design, and has been an active ISWC participant since 2001. She co-authored the Making Computers Wearable tutorial at ISWC 2003, and Humans: a Tutorial at ISWC 2006. Her current research is focused on garment-integrated body sensing.