Context-Awareness
Ch. 8 of Ubicomp Fundamentals

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Context Awareness

• Canonical Problem:
  • “You are in an unfamiliar office environment and would like to find the closest printer?”

• No Tech Solution:
  • Find someone who knows the answer and ask them

• The Simple Tech Solution
  • Find a list of printers online and a map and figure out which is closest

• The Context-Aware Solution
  • Use a program which ranks printers by proximity
The Context-Aware Solution requires:

• Knowledge of where the user is
• Knowledge of where the printers are
• Infrastructure for maintaining the accuracy of the information
• Software to make this information available at the right time
The first round of context-aware systems were essentially location-based services.

The Active Badge
- created a directory of locations of people
- enabled routing of land-line calls to offices

Modern LBS include
- Siri geo-fencing
- Sex Offender GPS anklets
- Yelp Restaurant Finder
Can we use more information about the world to help the application than just location?

- orientation
- light levels
- accelerometers
- protecting hard drives
What else?
The information that makes a computer do a better job of adapting to the human world is “context.”

Definitions include:

- “where you are, whom you are with, what resources are nearby” - Schilit
- “the subset of physical and conceptual states of interest to a particular entity” - Pascoe
- “any information that can be used to characterize the situation of an entity. An entity is a person, place or object that is considered relevant to the interaction between a user and an application including the user and the application themselves.” - Dey
Context Aware Systems

- “adapt according to it’s location of use, the collection of nearby people and objects as well as changes to those objects over time” - Schilit et.al.
- “automatically provide information and/or take actions according to the user’s present context as detected by sensors” - Brown
- “provides relevant information and/or services to the user, where relevancy depends on the user’s task”
Context Aware Systems

- Computers regularly adapt to their input

- Context-Awareness is about *implicit* input from
  - sensors
  - computers
  - other services
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- But this is hard because:
  - Sensors are ambiguous and impoverished.
  - Getting intent exposes it to privacy breaches.
  - Sometimes humans don’t know their intent.
  - Not all relevant context can be sensed (yet).
  - This removes the locus of control from the user.
The holy-grail of context-aware computing is to understand and act on human intent without interruption, but this is hard because sensors are ambiguous and impoverished, getting intent exposes it to privacy breaches, sometimes humans don’t know their intent, not all relevant context can be sensed (yet), this removes the locus of control from the user, the computer may not be able to explain why it is taking an action b/c the decision is too complex.
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- rules vs machine learning

Monday, October 15, 12
Sensor Ambiguity

Global Location GPS

![Graph showing frequency count over latitude and longitude.]
Sensor Fusion

Global Location GPS