Modal Interfaces & Speech User Interfaces

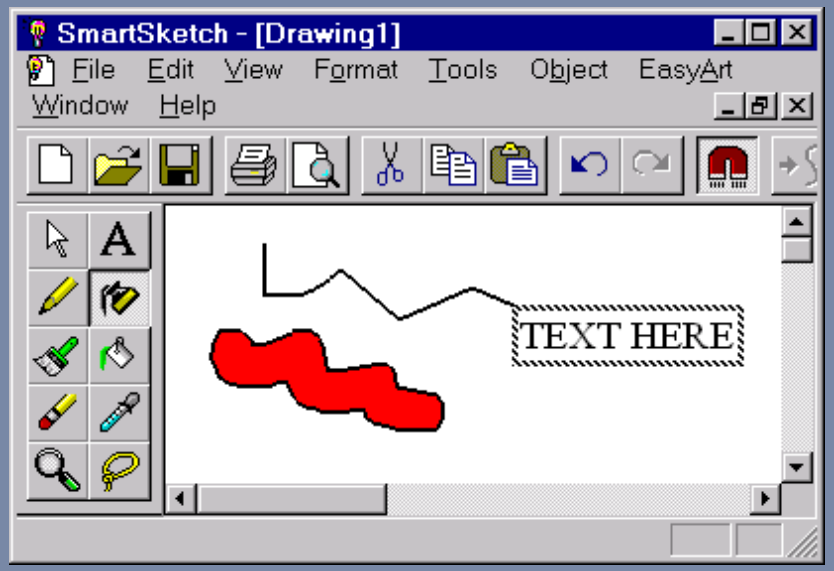
T. Scott Saponas

CSE 440 Discussion Section

Nov 7& 8, 2007

Modal User Interfaces

- **Modal**
  - **actions take on a different meaning depending on the current state or mode**
  - **e.g., dragging with mouse in a drawing program depends on the current tool**



Example of Modal UIs

- **Some dialog boxes**
  - **requiring action before anything else**
  - **why can this be bad?**
- **VI editor**
  - **command mode vs. insert mode**
  - **how do you know which mode you are in?**
- **Drawing/paint programs**
- **Palette-based programs**

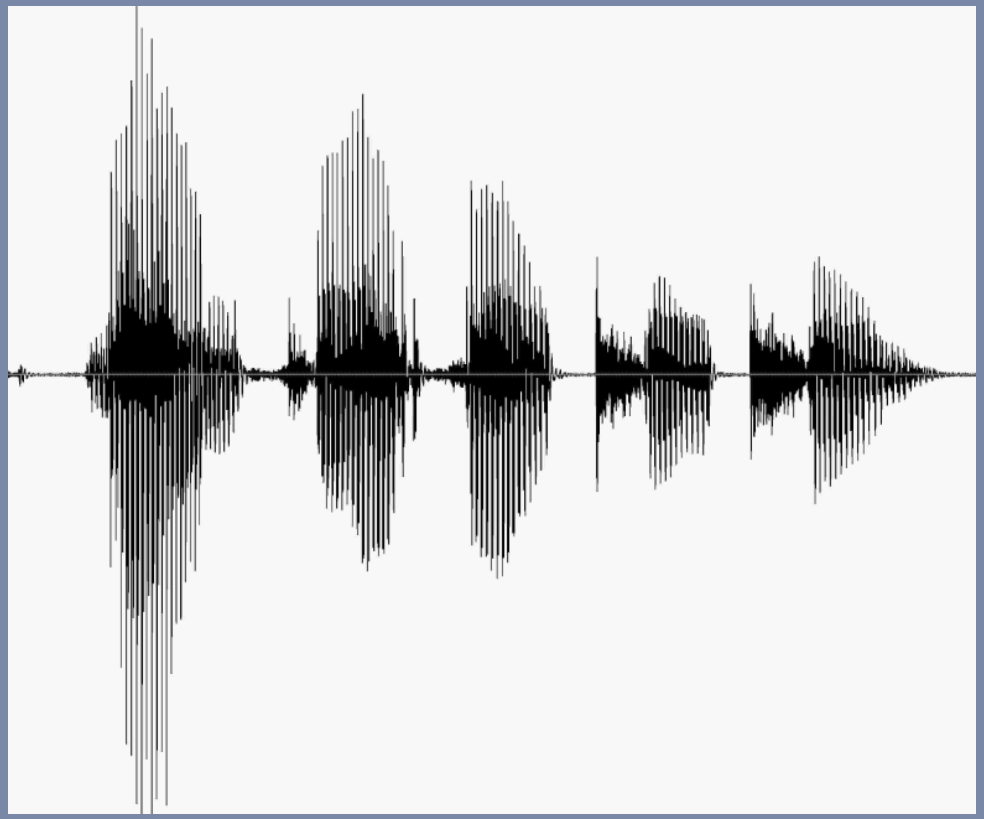
Problems with Modal UIs

- **Mode errors**
  - **think you are in one mode but really in another**
  - **e.g., in vi (want “mu” -> “muddle”)**
  - **if in command mode by accident, deletes the line**
- **Mode hides functionality you want**
  - **e.g., to deal with a dialog box must switch modes**
- **Constant mode switching may be slow**
  - **e.g. Adobe Illustrator**
  - **lots of tools in palette**
  - **One solution is keyboard shortcuts**
    - **(not a great solution)**

Are Modal UIs bad?

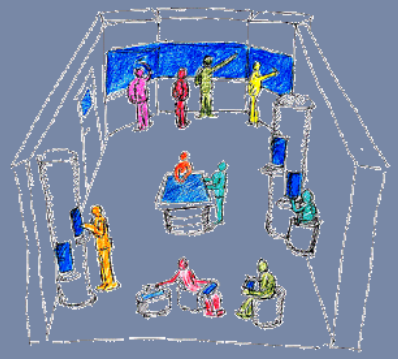
- **Not necessarily**
  - **can help make a large interface easier to use**
    - **do not need so many different commands**
- **Only bad if done wrong**
  - **modal dialog boxes**
  - **modes that are not visible (*)**
    - **palettes are a fine use of modes**

Speech User Interfaces



UIs in the Pervasive Computing Era

- **Future computing devices won't have the same UI as current PCs**
- **Wide range of devices**
  - **Small or embedded in environment**
  - **Often with alternative I/O & w/o screens**
  - **Information appliances**



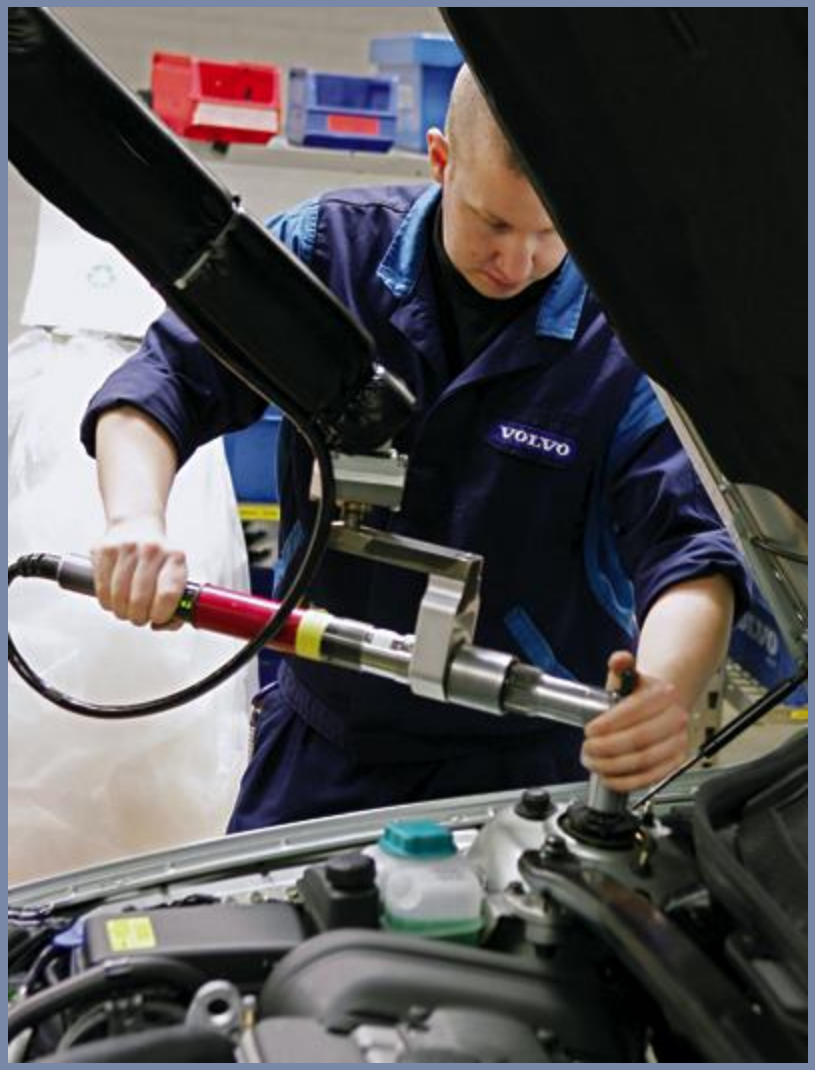
I-Land vision by Streitz, et. al.

Motivation

- **Smaller devices -> difficult I/O**
  - **People can talk at ~90 wpm (high speed)**
- **“Virtually Unlimited” set of commands**
- **Freedom for other body parts**
  - **Imagine you are working on your car and need to know something from the manual**
- **Natural**
  - **Evolutionarily selected for speech**
  - **Not for reading, writing or typing**

When to use Speech

- **Mobile**
- **Hands-busy**
- **eyes-busy**
- **Assistive Technologies**



Why are they hard to get right?

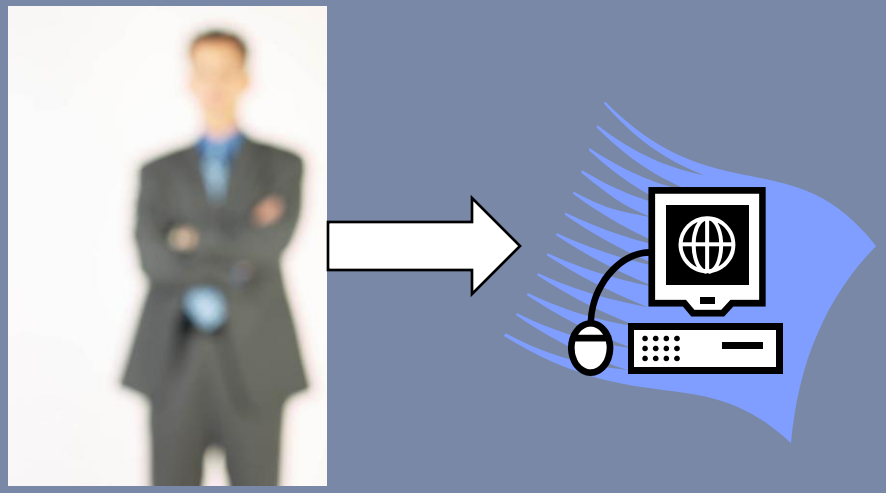
- **Speech recognition far from perfect**
  - **Imagine mouse with 5-20% error rate**
- **Speech UIs have no visible state**
  - **Can’t see what you have done before**
  - **Can’t see effect of commands**
- **Speech UIs are hard to learn**
  - **Can’t easily explore interface**

Why are they hard to get right?

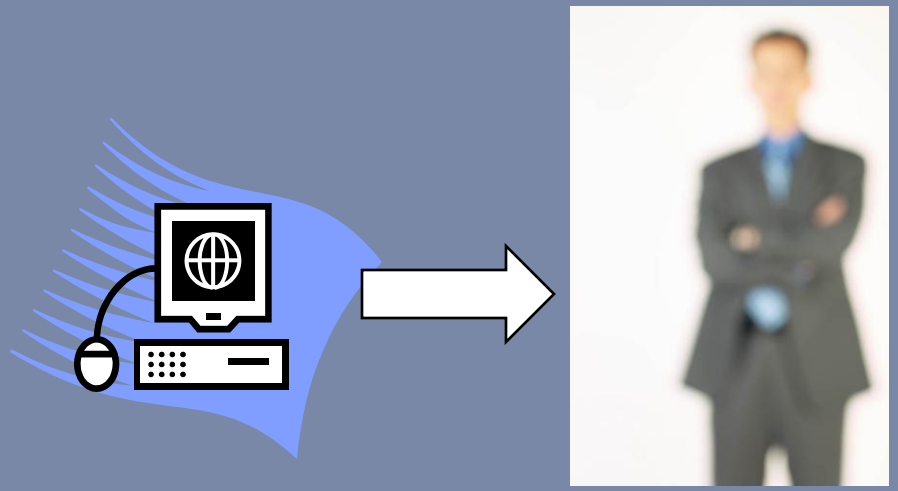
- **Isolated, short words difficult**
- **Segmentation**
  - **Recognize speech**
  - **Wreck a nice beach**
- **Spelling**
  - ***mail* vs. *male***
  - **need to understand language**
- **Context is necessary**

Speech UIs require

- Speech recognition
  - the computer understanding what the customer is saying.



- Speech production (or synthesis)
  - the computer talking to the customer.



Designing Speech UIs

- **Speech UI no-no's**
  - **modes**
    - **no feedback**
    - **certain commands only work when in specific states**
  - **deep hierarchies (aka voice mail hell)**
- **Verbose feedback wastes time/patience**
  - **only confirm consequential things**
  - **use meaningful, short cues**
- **No Barge-In Support**
  - **Must wait for UI to finish**

Designing Speech UIs

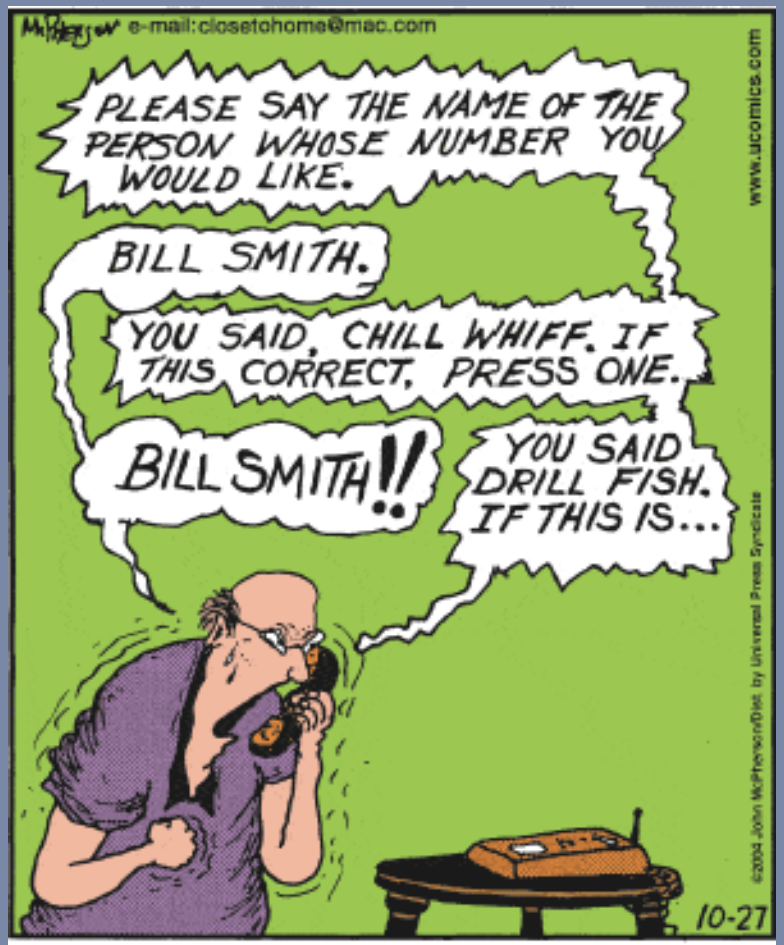
- **Too much speech is tiring**
- **Speech takes up working memory**
  - **can cause problems when problem solving**
- **Establish shared context**
  - **Make sure people know**
    - **what type of tool they are using**
    - **where they are in the conversation**

Designing Speech UIs

Pacing

- **recognition delays are unnatural**
  - **make it clear**
- **barge-in lets user interrupt like in real conversations**
- **progressive assistance**
  - **short error messages at first**
  - **longer when user needs more help**
- **Implicit confirmation**
  - **include confirm in next command**

Disadvantages of Speech UIs



Close to Home

John McPherson

Disadvantages of Speech UIs

- **Disruptive**
- **Privacy Concerns**
- **Recognition Errors**
- **Multiple Verbal Tasks (Interference)**
- **Context Errors**

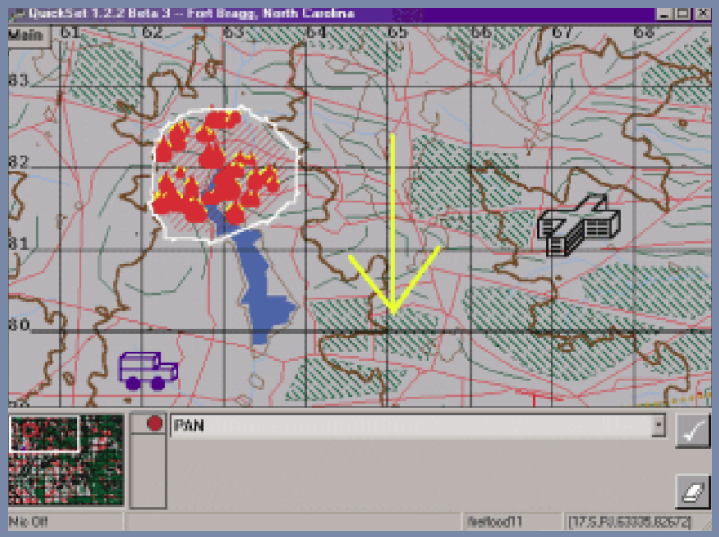
Future UIs for Information Access

- **Star Trek style UI**
  - **verbally ask the computer for info or services**
  - **Hard: it requires perfect speech recognition & unambiguous language understanding**

Future:

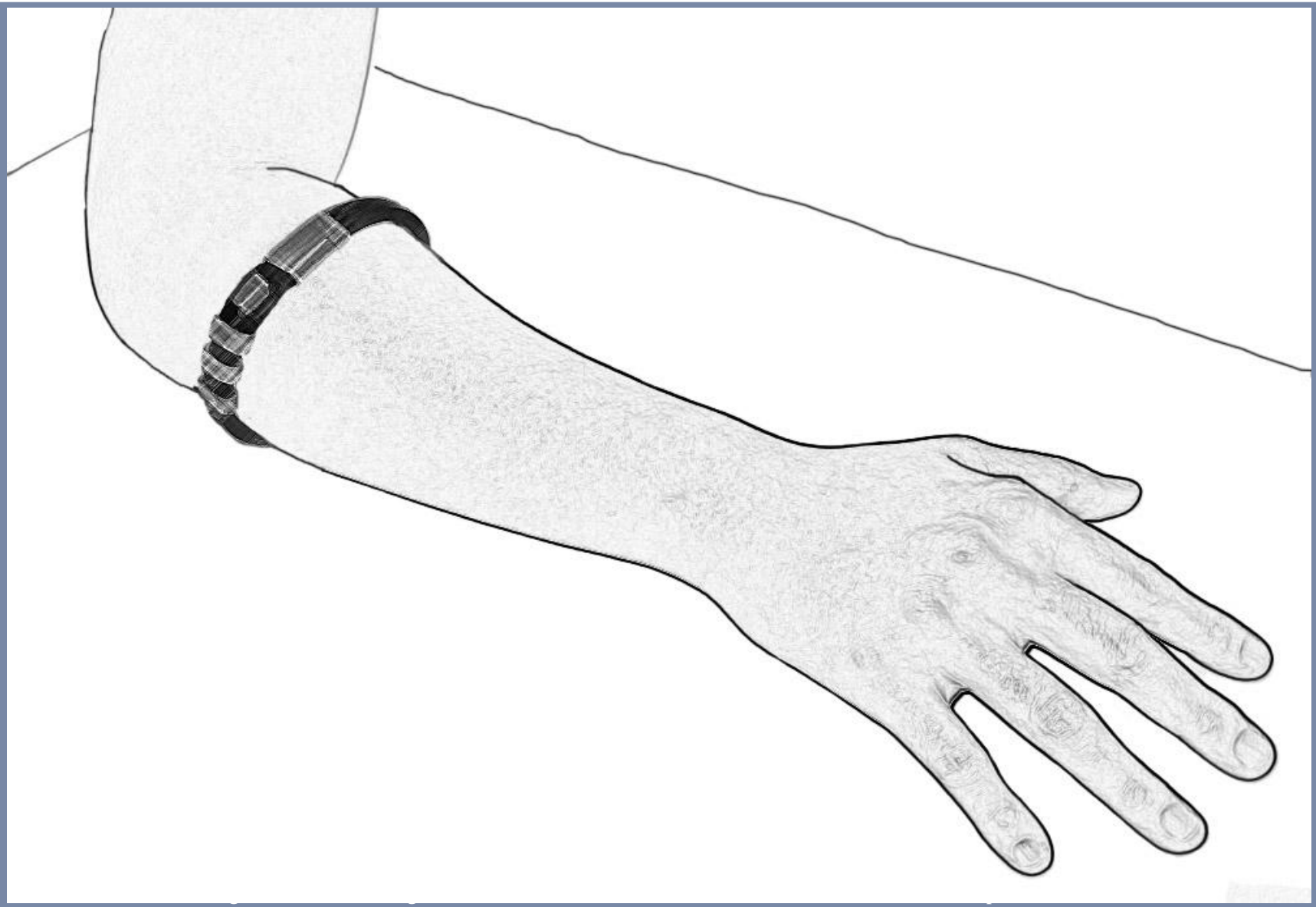
MultiModal Interaction

- **Multimodal interfaces use different kinds of input (e.g., pen and speech) together**
- **Achieves "put that there"**



VoicePen:
Augmenting Pen Input with Simultaneous Non-Linguistic Vocalization

Muscle-Computer Interaction



Future:

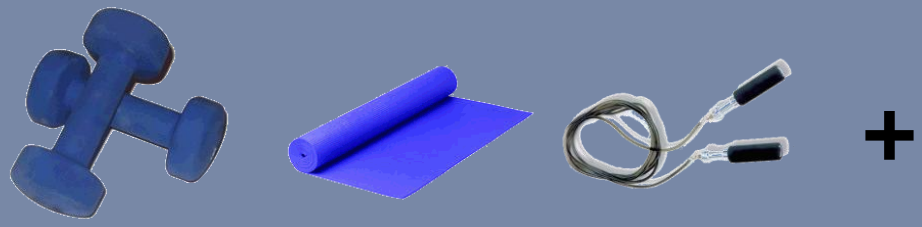
Context-Aware Applications

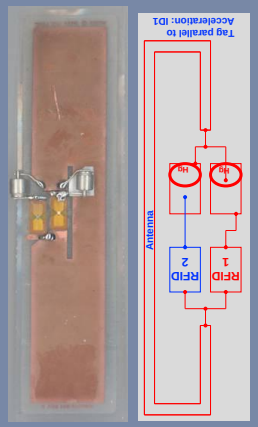
- **Apps are aware of context**
  - **User location**
  - **What they are doing**
  - **Who is around**
  - **What is appropriate / relevant**

Future:

Kate Everitt's Research

- **Use physical context to assist speech recognizer**
- **α- WISP tags detect objects in use**
- **Activate different grammars based on state of objects**





Questions

- **When would you use a speech UI?**
- **What speech UIs have you encountered?**
- **Have they been good?**
- **How have speech UIs changed?**
- **What are the problems with Speech UIs?**

Summary

- **Speech UIs**
  - **May permit more natural computer access**
  - **Allows us to use computers in more situations**
  - **Are hard to get to work well**
    - **Lack of visible state, tax working memory, recognition problems, etc.**
    - **Multimodal UIs address some of the problems with pure speech UIs.**

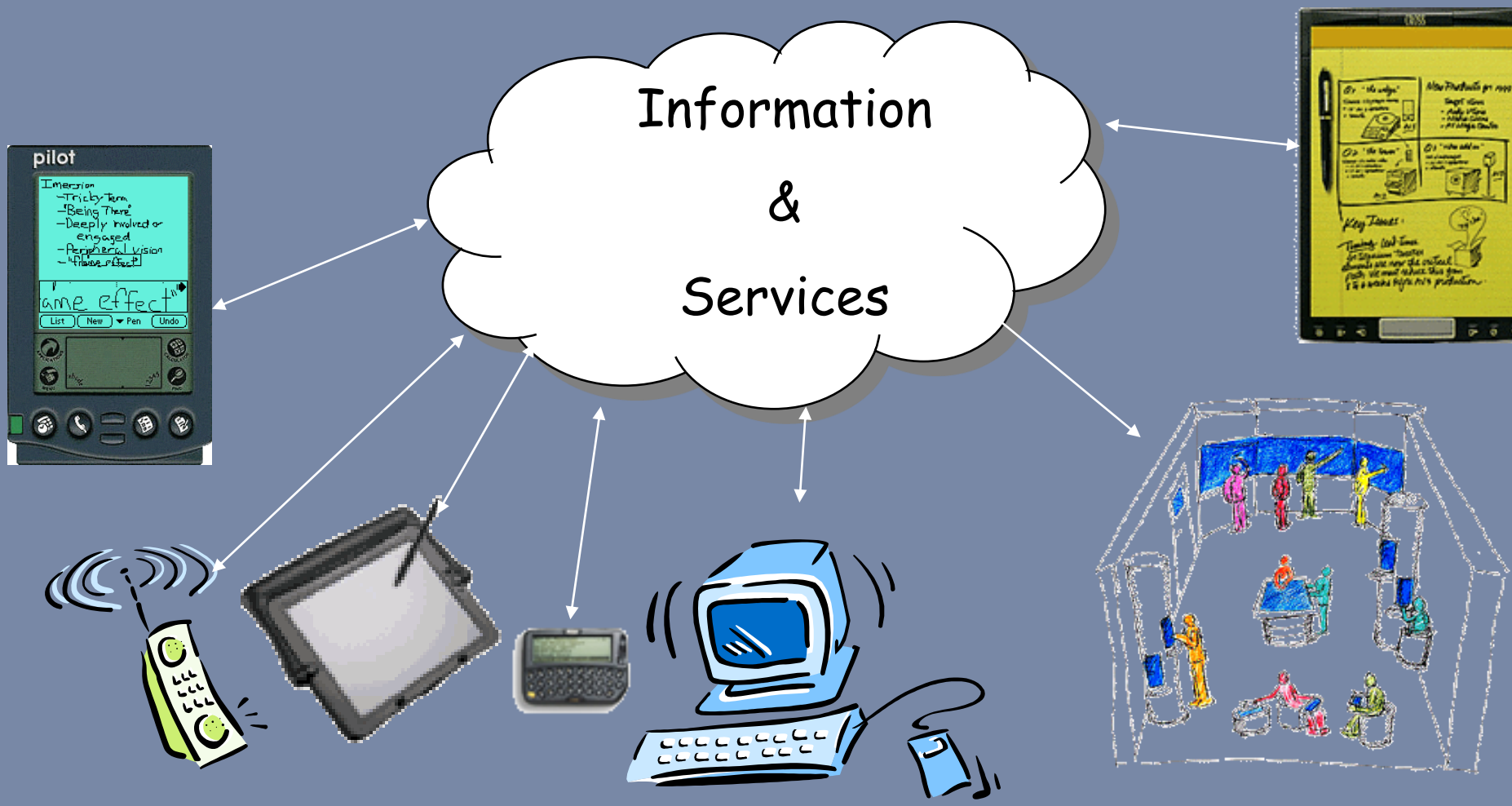
Exercise

Would you use a speech UI for the following?

Why or why not?

1. **Banking system**
2. **Registration/Enrollment for University**
3. **Internet browser for blind users**
4. **Remote service manual for traveling repairman**
5. **Database management system**

Motivation for Speech UIs: Pervasive Information Access



Information access via speech