RFID for Healthcare: Some Current And Anticipated Uses

Ken Fishkin

kfishkin@intel-research.net

Intel**Research** Seattle

Healthcare is a good match for RFID

- RFID is robust to heat and grime
- RFID can be engineered to work with no special user action (i.e. passive detection)
- More bits means more tailored use
  - Pill expiration date
  - Which patient this item is for, etc.
- Tag cost less important given high value propositions
  - Prevent mis-medication
  - Know that grandma is OK
  - Increase child safety

Intel **Research** Seattle
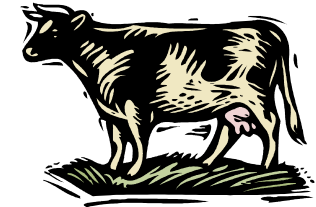
Enhanced Healthcare with small readers

- Most RFID applications use large (dinner plate sized) reader antennae, because of their range

- But we can now have very small (car remote-sized), very short-range readers

- These fit into many health care scenarios

skyetek.com

Intel **Research** Seattle
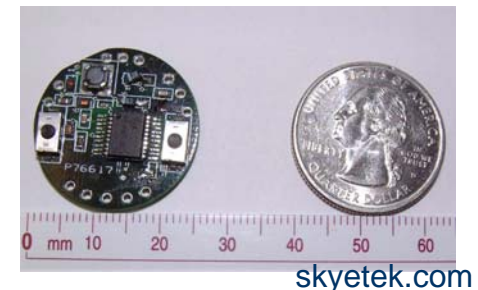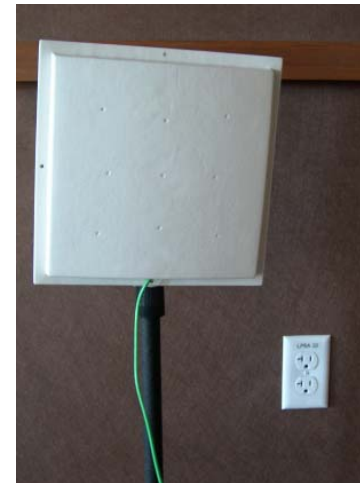
Hospital

- Two ways to track tags
  - Using large reader
    - Where's patient <X>, doctor <Y>, equipment <Z>, chart <W> right now?
    - Related to supply chain management, important but similar use scenario
  - Using small reader
    - Readers are now small enough that they can be integrated into equipment at high-value points
    - Examples: augment IV , blood drip or anesthesiology hoses to prevent mis-medication

Better eldercare

- Augment a medicine cabinet to know when you take pills, and how many

Intel **Research** Seattle

The "Invisible Man" approach

- What if *many* of the tools in the hospital, or objects in the home, are tagged?

- We can help infer what people are doing by looking at how they use those objects

- Let's return to those earlier domains

Intel Research Seattle

Better eldercare

- "ADL Monitoring" (Activities of Daily Living) is an expensive, invasive, error-prone aspect of home elder care

- If RFID tags are scattered about a house (either from purchase, or manually), and RFID readers can detect when you come near those objects

- Then we can do a good job of inferring ADLs, including medication taking

- Result: less caregiver and family stress, less taxpayer $$

- A case where RFID can *increase* privacy

| Activity	Precision / recall
Personal Appearance	92/92
Oral Hygiene	70/78
Toileting	73/73
Washing up	100/33
Appliance Use	100/75
Use of Heating	84/78
Care of clothes and linen	100/73
Making a snack	100/78
Making a drink	75/60
Use of phone	64/64
Leisure Activity	100/79
Infant Care	100/58
Medication Taking	100/93
Housework	100/82

Intel **Research** Seattle

Hospital

- Assess med school students

- in the long term, help doctors and nurses proactively through their jobs

- Pilot project between Intel and U Washington Medical School, Anesthesiology Dept.

Intel **Research** Seattle

Infantcare

- Sensor networkss to aid Autism caregivers (GA Tech): could use RFID to augment the Child Behavior Observation System (CBOS) and the Pla-Chek
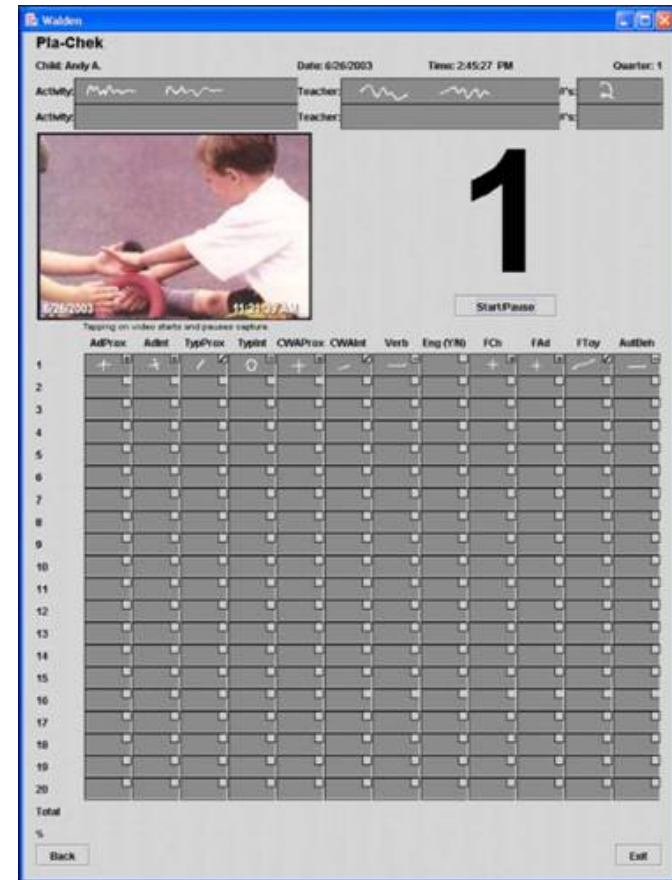
Courtesy Gillian Hayes, GA Tech

Intel **Research** Seattle

Let's see a video!

FTC Workshop - Fishkin

Intel **Research** Seattle

For more details

- **RFID for activity inferencing**
  - University of Washington, Intel Research Seattle
    - http://seattleweb.intel-research.net/projects/activity/

- **Sensors for autism caregivers**
  - Georgia Tech
    - http://www.cc.gatech.edu/~gillian/CareLog.htm

- **RFID medicine cabinets**
  - Accenture, Intel Research Seattle

- **Blood bag & patient monitoring**
  - Maxell, Precision Dynamics, Mass. General, Lattice, Georgetown University Hospital

Intel **Research** Seattle

Backup

FTC Workshop - Fishkin

Intel **Research** Seattle

Better infantcare

- Have a toddler wear a small portable RFID reader

- It broadcasts "toddler nearby"

- Nearby RFID tags listen to that message, consult local code snippets ("taglets") and decide what to do

  - Lock the Drano cap

  - Lock the kitchen cabinet

  - Turn off the oven burner

  - Unlock the fridge door

  - Track the toys

- Many other possibilities: "allergic to peanuts", "diabetic", etc. RFID tags can use taglets to create/interpret interaction/actuation language

Intel**Research** Seattle

Hospital

- "One specific application that the company is looking at is using RFID to accurately identify bags of blood used for transfusions, although exactly how Maxell's tags and readers might be used to do this has yet to be determined"

- Massachusetts General Hospital has begun to study RFID "smart tag" technology to improve the bedside check. Working with Precision Dynamics Corporation, a major supplier of hospital wristbands and with Lattice Corporation, a software company focused on improved patient safety, we have begun to develop an RFID solution to the problem of transfusion error in the Operating Room

- Precision Dynamics Corporation (PDC) and Georgetown University Hospital's (GUH's) Blood Bank will conduct a pilot study to explore how Radio Frequency Identification (RFID) wristband solutions increase the efficiency and reliability of blood transfusion safety

Intel Research Seattle