WSN in the Lab
WSN in the Field
WSN in the Field
Plug & Play Sensor Network

3 Sensor Platforms Powered UP

3 OSGi Service Bundles appear in the IDE
Programmable Sensor Networks

• Plug & Play (self-integrative)

• Service-oriented architecture
  – Every sensor or actuator is converted into a software service, easily digested by programmers
    • Engineers $\rightarrow$ Programmers (IT Industry)

• Programming & Application Development
  – Remote programming
  – Integrated Development Environments (IDE)
Context Aware Computing

• Define Contexts as special states of interest of the pervasive space
  – Example: day/night, hot/cold, just arrived, sleeping, etc.
• Use the states to guide the scope or set precondition for logic and action in the space
• Also, use states as taboos or “impermissible” contexts that should not be allowed to happen
Programming Models

Safety Stability

Mortar and Brick House of Today

Context Driven Model

Service Oriented Model

Favorable Target Paradigms

Lowest Acceptable Safety Standard

Expressiveness

Controllability

Flexibility
Standards for Sensor Networks

• Sensor Platform
  – None: only de-facto. tinyOS, nutOS, TRON (The Real-time Operating system Nucleus)

• Networking
  – IPv6 (IP over X (ZigBee) – IETF)
  – Ad-Hoc: there will soon be a standard

• Sensor Connections
  – IEEE P1451

• Integration
  – Open Services Gateway initiative (OSGi)

• Programming
  – None
IEEE 1451 Smart Transducer Interface System Block Diagram

IEEE 1451.2 Interface

Transducer Independent Interface (TII)

Any Arbitrary Network

Physical world

Smart Transducer Interface Module (STIM)

XDCR → ADC
XDCR → DAC
XDCR → DI/O
XDCR → ?

Transducer Electronic Data Sheet

Address Logic

Network-Capable Application Processor (NCAP) with 1451.1 Object Model

K. Lee, NIST, 6/4/01