Overview of the Generic Sensor Kit (GSK)

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Outline

• Goals
• Usage Model and Tool Set
• Architecture
• Description of components
• Status and Future Work
• Sneak Preview
Overall Goals

• Provide an **end-to-end** software suite for rapid sensor network deployment

• Break down the **barrier to entry** to sensor network applications for **non-computer sophisticated** users: biologists, vineyard managers, facility managers, civil engineers, etc. ...

• Integrate and drive our research
Immediate Goals

• *No Mote programming* or code downloading
• Focus on *data collection* applications
• Single integrated package with minimal configuration
• Easy integration with popular data analysis tools
• Scale: up to 100 nodes
• Longevity: 6 months at 1-2% duty cycle
GSK Usage Model

1) Deploy pre-programmed sensor nodes → Deployment Tool

2) Configure data collection criteria → Configuration Tool

3) Collect sensor data and monitor network statistics → Logging to DBMS

4) Visualize and analyze sensor data and network data → NW Monitoring Tool, External Tool

5) Diagnose problems and refine data collection criteria and network configuration → Diagnostics Tool
GSK Architecture

DBMS
- Sensor Data
- NW Stats
- Calib. Data
- Config Log
- Mote Registry

Internet

GSK Server
- Basestation
- JDBC

GSK Field Tools

GSK Client Tools
- Deployment
- Data Display
- NW Monitor
- Configuration

Sensor Network

Excel

JDBC/ODBC

GIS

MATLAB
GSK Mote Side Components

Tiny DB

Diagnostics

Tiny Schema: Attributes and Commands

Multi-hop routing

Watchdog
EEPROM FS
Time Sync.
Abs. Timer

TinyOS Core
GSK Server

• Provide (Java) API to all client tools
• Inject queries and commands into sensor network
• Deliver live data from sensor network and to interested clients
• Log all data, queries and commands to DBMS
• Metadata management
  – Mote locations and maps
  – Mote capabilities: type of sensors
  – Mote characteristics: power consumption
  – Sensor calibration/conversion parameters
GSK Field Tool

• Run on a hand-held device

• Diagnostics:
  – Only communicate with motes in radio range
  – Pull motes out of sleep
  – Ping a node and collect vital signs
  – A small number of other commands: reset, buzz, etc.

• Deployment
  – Placing Motes on a map and record locations
GSK Client Tools

• Deployment and Diagnostics
• Configuration
  – Select attributes, filters and aggregates
  – Set sample rate or network lifetime
• Network Monitoring
  – Visualization of network topology and other health statistics
Current Status

• Developed most pieces

• Remaining tasks:
  – Integration between TinyDB, new multi-hop routing, time sync, snooze
  – More polished GUI

• General Availability: early Q1 2003
Future Work

• Apps, apps, apps, … no hand holding
• Deployment Tool
  – Network formation advisor
  – Run on handheld
  – Data synchronization with DBMS
• Web-based Client Tools
• Network monitoring triggers and alerts
• Unified interface to access live and historical sensor data
• Support for heterogeneous sensor networks
• Failover of GSKServer and DBMS
• Beyond data collections
Demo Time