Next-Generation Prototyping of Sensor Networks

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BTnode rev3 prototyping platform

Core microcontroller • Atmel ATmega128L (AVR RISC 8 MHz @ 8 MIPS)
Core memories • 64+180 kB SRAM, 128 kB Flash, 4 kB EEPROM
Bluetooth subsystem • Zeevo ZV4002 single chip
• Bluetooth v1.2 certified
• +4 dBm output power, class 2
• AFH/SFH Scatternets, 4 simultaneous Piconets
Low-power radio • Chipcon CC1000 operating in 868 MHz ISM Band
Power supply • 2 AA cells, power-switch, battery monitor
• individual radio power management
• in-situ power profiling

Berkeley mote compatible hardware architecture

Software Support
• BTnut - multithreaded C programming
• TinyOS - NesC programming with contrib/tinybt
• serial bootloader program upload

Networking with multi-frontend BTNodes

Low-bandwidth Short Range Devices
• heterogeneous networks of Motes and Bluetooth devices
• bandwidth–power–latency trade-offs
• wake-up radio schemes

High-bandwidth Bluetooth link-layer connectivity
• 7 active slaves and 4 simultaneous Piconets per node
• abstract and event based Host Controller Interface
• flexible topology management
• service multiplexing

Full custom MAC layer

Robust link-layer connectivity

Current situation

It is hard to deploy beyond 10-20 nodes. - Coordinated methods, concepts and tools are missing today.

Deployment-support networks for sensor networks with BTnodes

Multihop serial-cable replacement
• virtual host-target connections with BTnodes
• simple experimentation and test
• alleviating cabling infrastructure

Deployment procedure
• BTnodes attach to target devices
• construction and maintenance of backbone network
• host controller opens virtual connection to any attached target

Enabling scalable, coordinated deployment
• remote debugging, monitoring and validation