

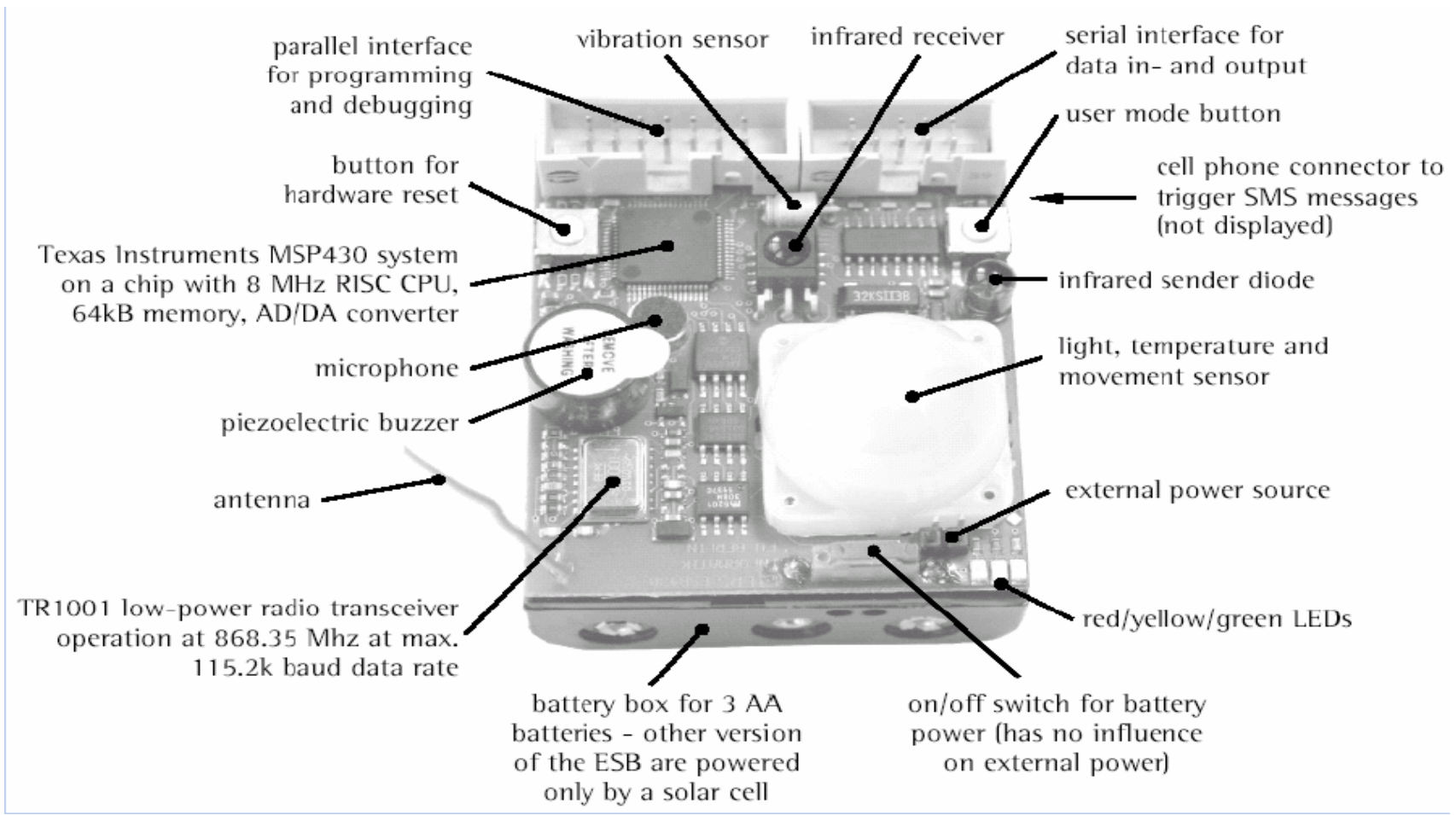
Scatterweb platform

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Overview

- > Scatterweb (<http://www.scatterweb.de>)
 - Hardware (ESB nodes, gateways)
 - Applications
 - Scatter OS
- > Contiki OS (SICS Sweden)

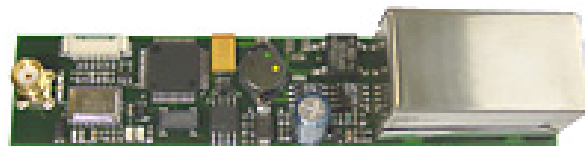
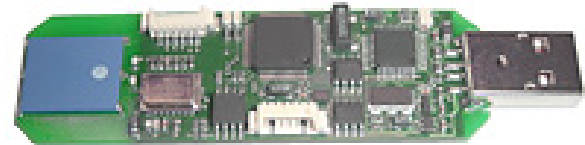
ESB nodes



Successor with Chipcon-Chip is in preparation

Gateways

- > Full access to the ESB nodes (in connection with ScatterStudio / ScatterViewer)
- > Over-the-air flashing
- > Windows and Linux drivers
- > PoE
- > Built-in Web server



Applications

- > ScatterStudio (modular software to access nodes)
- > ScatterViewer
 - Data logging, node management, OTA flashing, routing
- > TinyOS with some applications
- > Contiki OS
- > Ns-2: userapp-code can be compiled and run in ns-2

ScatterOS

- > Software architecture
 - System (handles interrupts, hardware access, sending / receiving)
 - Infinite loop where sensor events are periodically checked
 - Sleep if nothing has to be done
 - Application code

 - Threads (simple cooperative scheduler)
 - Minimal memory requirements
 - No memory, only static allocated space for task tables, etc.
 - Task functions shouldn't allocate stack space
 - All state must be held in vars defined globally -> restrictions

ScatterOS vs. TinyOS

	ScatterOS	TinyOS
Hardware / Software Watchdog	√	X
Error handling	√	X
System time	√	√
Global Time / Date	√	X
DCO (digital clock, precise) Checker	√	X
Threading	Threads	Task queue
OTA flashing	√	√
Terminal Interfaces	Scatter Studio Scatter Viewer	C – Serial Forwarder
Security	AES, RSA, MD5	Tiny Sec

...

	ScatterOS	TinyOS
Database	ScatterDB	TinyDB
MAC	SMAC, TMAC, LMAC (soon)	SMAC, TMAC, BMAC, SMACS
NS2	√	(full?) √
TinyOS	√	Obvious
ScatterOS	Obvious	X

The Contiki Operating System

- > Developed at the Swedish Institute of Computer Science (SICS)
- > Runs on typical sensor nodes:
 - main platforms ESB (FU Berlin), Tmote Sky, but also Linux, C64 etc. (Contiki is easy to port, Contiki runs on > 20 platforms)
- > Event-driven kernel
- > Small memory footprint (< 1 KB RAM, < 10 KB ROM)
- > Current users include SICS, KTH, Uppsala Univ., UCC Cork, UCL, Lancaster Univ., Univ. of Coimbra, Swedish SME Emwitech
- > Well documented, network simulator available
- > BSD-style license

Contiki features not found in e.g. TinyOS

- > Multitasking:
 - Threads inherently require extra memory (stack)
 - Contiki supports threads for applications that require it e.g. long-running computations
- > Support for dynamic loading and unloading of modules during runtime
- > Protothreads:
 - lightweight threads that enable sequential programming on top of an event-driven system
 - overhead 2 Bytes RAM per protothread
- > Main drawback: Almost no protocols/applications are supported yet