

Ambient Power and Communications Module (AMPCOM) for Sensors and RFID Tags

Ambient Micro
 Maui Research & Technology Center
 590 Lipoa Parkway, Suite 127 Kihei, HI 96753
 Phone (866) 561-4823 Fax: (866) 728-9726
 Scott A. Weeker
 Email: sweeker@ambient-micro.com

Ambient Power and Communications Module (AMPCOM)

Self-Generating Ambient Power for Data Collection and Communications Devices

- ### Key Discriminators
- Eliminates need for device battery replacement or recharging
 - RF Magnetic Energy technology converts radio waves into electrical power
 - Multiple energy sources increase total power; automatically adapt to collect available ambient energy (solar, thermal, vibration, RF)
 - Very Low Power data communications (VLP-COM) combined with ambient power supply; reduces power demand while generating sensor power
 - Self-generating power for multi-year operating life in harsh conditions
 - Low cost, chip-sized module reduces costs for retrofitting existing sensors
 - Non-toxic, non-polluting power supply supports new disposable sensor applications (e.g. border monitoring)
 - Remote activation and powering capabilities support identification and authentication, personnel and asset tracking, and smart switch applications
 - Use in battery-less Active and Hybrid RFID tag applications
 - Initial research funded by Office of Naval Research /HTDV
 - Interest shown by: Central Intelligence Agency; Pacific Disaster Center ; Sun Microsystems; Texas Instruments

Problem/Readiness/Champions

Problem Being Addressed: Embedded and remotely distributed wireless sensor networks are limited by the operating life, size, toxicity, and costs of their battery systems.

Applications:

Defense/Security: Power supply for disposable microsensors for: detection of IEDs; monitoring of national borders; chemical plants; urban transit systems.; embedded CHM and CBR applications; pilot rescue

Commercial: Battery-less active RFID tag for asset and personnel tracking; industrial sensors; home automation; cell phone recharging. disaster relief

Technology Readiness Level
 The RF Magnetic Collector technology has completed level 3. Estimated date for reaching TRL 6 is June 2006.

Champions

- ONR/HTDV have funded a \$90,000 initial proof of concept and \$300,000 follow-on contract for prototype development.
- Sun Microsystems RFID Test Center has expressed interest in “hybrid” RFID tags (e.g. powered passive tags) for greater item tag read range and accuracy, and encryption.

Milestones/Deliverables/Date/Status

<u>Milestones</u>	<u>Deliverables</u>	<u>Date</u>	<u>Status</u>
Design/assemble RF Magnetic Collector Model	Model used to confirm test data, initial design	6.15.05	complete
Survey sensor power requirements and ambient Energy transducer suppliers	Define AMPCOM design requirements	2.15.06	WIP
Design engineering model of ambient power supply	Computer models to design RF and energy components	4.15.06	WIP
Design and produce proprietary Alloy for RF Energy collector	Develop with QuesTek; machine and shape for prototype	5.1.06	WIP
Integrate multiple transducers	select suitable ambient sources	5.15.06	WIP
Assemble and test multi Source ambient power supply	Build RF Magnetic Collector and power supply module	6.15.06	WIP
Identify COTS/GOTS VLP-COM components	Select and test VLP-COM Components for prototype	9.1.06	WIP
Assemble and demonstrate AMPCOM module	Test with selected sensor and communications devices	11.1.06	WIP