UMaine: Battery-free Wireless Sensing with Multiple Access Feature

BASIC INFORMATION

Project Classification:

Sponsoring CANEUS Work Program Board:

Tracking Number:

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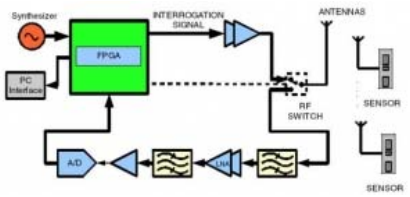

PROJECT DESCRIPTION

Problem Statement: Aerospace industry is in need of passive (no-power at sensor), small and rugged devices to operate in a reliable communications system. The whole HW/SW end to end system need to be developed in a coherent manner to achieve high efficiency.

Approach/Solution: Passive encoded surface acoustic devices and FPGA based interrgoator systems are proposed to address the need.

Required Technologies/Facilities: Our fabrication facilities are limited to few hundreds of MHz. We need to move into few GHz to

- Increase the signal bandwidth and reliability
- Reduce sensor size
- Reduce antenna size

The required facility should be able to make photo-lithography on crystal peizo substrates to deposit metalic micron size fingers which represents the codes.

Affected Applications: Structural health monitoring of vehicles, high temp sensing, and embedded sensing applications

Required Stake Holders/Experts: We lack Antenna experts to help us develop small antennas with broadband capability and high efficiency.

BACKGROUND

Milestone	TRL	Risk	Measure of Success	TRL Date
delivery of proof of concept sensor device/ system	5	Low	system performance, probability of error	

Deliverables: Sensor device with no power
programable interrgoator system
signal processing software
coding and modulation design process

Outreach/Organizational Interfaces: Industrial partners, NASA and other government agencies interested in this technology such as DHS, DOT, USDA.

Academic Contribution/Work Force Needs: We have several funded projects for research training of students. Partnership with industry and government agencies are sought to commercialize the system

Business Development and Regulatory Compliance:

PROJECT EXECUTION

ROM Cost

2009	2010	2011	2012	2013	TOTAL
500,000	500,000	500,000	500,000	500,000	2,500,000

Team Members and Roles: UMaine team: Maurioc da Cunha (Device expert), Ali Abedi (system expert), 1 postdoc (system integration), 1 postdoc (antenna), 4 grad students (research), and 12 undergrads (development)

Potential Funding Sources: NSF, NASA, NRC, NSERC, DHS, USDA, FHWA, DOT, GE, Honeywell, Boeing, NSC, Dielectric Communications

Business Case: Huge immediate market exsits and backed up by ISA 100 participants such as BP, Exxon, GE, Honeywell, Sensicast to use passive sensors for oil/gas monitoring. Aerospace long term needs are also another aspect.

Business Impact: Paradigm change in design of wireless sensors from separate sensor and radio design and integration to a new integrated approach where the radio is the sensor!