



Cognitive Ultra Low-power Sensor System (CUPSS)

AT A GLANCE

WHAT IS IT?

CUPSS is an ultra low-power sensor system for security, surveillance and intelligence gathering applications. It includes a multimodal sensing node with wireless fencing capability supported by an ultra low-power hardware platform and a cognitive sensor management framework.

HOW DOES IT WORK?

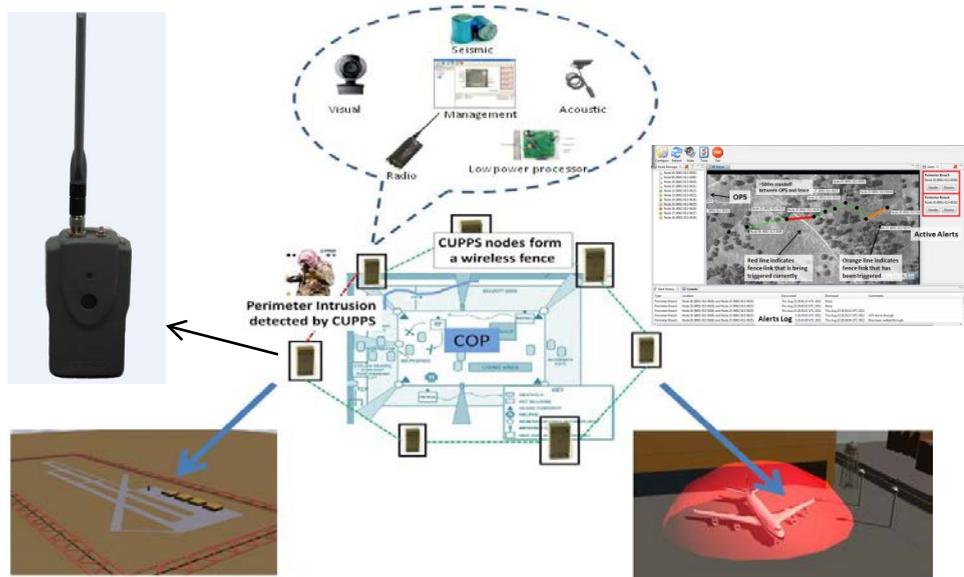
Higher-power RF sensors get triggered by activation of low-power passive sensors with different modalities (seismic, acoustic and imaging). Power consumption is drastically reduced by employing duty cycling, smart synchronization and tight sleep cycles.

WHAT WILL IT ACCOMPLISH?

The CUPSS low-power, low-cost, versatile, smart-sensor capability will provide real time security for important military assets. It can be deployed in a wide variety of different contexts (depending on the CONOPS) as a general purpose ISR sensor for situational awareness and intelligence gathering tool. The data analysis and fusion algorithms resulting from this research will be integrated into emerging net-centric Navy and Marine Corps C2 and ISR acquisition programs.

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The Cognitive Ultra Low-power Sensor System, or CUPSS, provides unprecedented ultra low-power sensing performance among fully mesh-network connected multi-modal sensor nodes. Ultra low-power operation enables exceptionally long runtimes (greater than 10 years) using only small batteries (2x C-cell batteries) and no solar or other power input. The sensor nodes are connected in a full mesh network, allowing for remote sensor control and status querying. Alerts and data are delivered to a monitoring station for action and logged for later review.

A Field Unit Evaluation (FUE) of the first-generation CUPSS is underway in the Pacific. This system uses numerous CUPSS RF sensing nodes to cue higher-power commercial off-the-shelf IP cameras for area surveillance and intruder identification by security personnel. The system has been operational since late June 2014.

Research Challenges and Opportunities:

- Ultra low-power seismic, acoustic and imaging sensing (less than 0.2mW)
- Low-power synchronized RF sensing enabled by synchronization (less than 10mW)
- Layered sensing approach to achieve 10-plus years operation on 2x C-cell batteries