

SBIR 06.2 PHASE I - AWARD DETAILS	
ORGANIZATION	MRMC
TOPIC NUMBER	A06-168
CONTRACT NUMBER	
YEAR OF AWARD	
AWARD START DATE	
AWARD COMPLETION DATE	
PROPOSAL NUMBER	A062-168-3147
TITLE	Wireless Sensor Network with Multiple Sensors for Chemical and Biological Threat Detection
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COMPANY	Erallo Technologies, Inc. 20 Taylor Street Littleton MA 01460-1416 Minority Owned: No Veteran Owned: No Number of Employees: 5
KEYWORDS	Wireless Sensor Networks, Multi-Sensor Data Fusion, Mesh Networking, Chem/Bio Sensors, Threat Detection, Sensor Nodes, RF mote
ABSTRACT	<p>The technical objective of this proposal is to design a flexible and efficient wireless, ad-hoc, sensor network architecture that is tuned for monitoring chemical and biological threats. This requires that the architecture 1) support various types of chemical and biological micro-sensors in a heterogeneous sensor network, 2) enable "smart" sensor nodes to pre-process on-board the enormous amount of data they collect, 3) facilitate collaborative communication and routing between sensor nodes, in a loosely dispersed and irregular grid, and 4) wirelessly transmit their data to a central station, in real-time or near real-time. To achieve flexibility, the concept of layers will be used to define the network level and sensor level. To achieve smart decision making capabilities, artificial intelligence (AI)-based software agents will be defined. To achieve auto-configuration, collaboration and real-time data transmission, ad-hoc mesh networking techniques will be employed. A limited demonstration will be conducted to illustrate the feasibility of the wireless sensor network and proposed architecture. Commercial RF components will be used to demonstrate the real-time communications, on-board processing, wireless data transmission and mesh networking capabilities of the network. Currently available and prototype chemical sensors will be deployed with RF devices into the network to demonstrate the feasibility of their integration and operation in the network. The sensors will include a nanoparticle, array-based sensor for vapor detection (developed the Next Dimensions Technologies and the California Institute of Technology for DHS). An electrochemical ethylene monitor (developed by Giner, Inc. for NASA) will be combined and demonstrated as part of the Multi-Sensor Data Fusion in the option task.</p>

BENEFITS

Early detection is the key to mitigation of the effects of a biological attack or incident, including smart monitoring techniques and devices. The advances in wireless ad-hoc mesh networks, miniaturized radio frequency (RF) devices and nanotechnology-based sensor elements can significantly move forward the capabilities of monitoring for prevention and detection of chemical and biological threats.