Simulating Operation of a Complex Sensor Network

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Simulation Tool for ASCTA Microsensor Network Architecture (STAMiNA) [“ASCTA” denotes the Advanced Sensors Collaborative Technology Alliance] is a computer program for evaluating conceptual sensor networks deployed over terrain to provide military situational awareness. This or a similar program is needed because of the complexity of interactions among such diverse phenomena as sensing and communication portions of a network, deployment of sensor nodes, effects of terrain, data-fusion algorithms, and threat characteristics.

STAMiNA is built upon a commercial network-simulator engine, with extensions to include both sensing and communication models in a discrete-event simulation environment. Users can define (1) a mission environment, including terrain features; (2) objects to be sensed; (3) placements and modalities of sensors, abilities of sensors to sense objects of various types, and sensor false-alarm rates; (4) trajectories of threatening objects; (5) means of dissemination and fusion of data; and (6) various network configurations. By use of STAMiNA, one can simulate detection of targets through sensing, dissemination of information by various wireless communication subsystems under various scenarios, and fusion of information, incorporating such metrics as target-detection probabilities, false-alarm rates, and communication loads, and capturing effects of terrain and threat.

This program was written by Esther Jennings, Loren Clare, and Simon Woo of Caltech for NASA’s Jet Propulsion Laboratory.

This software is available for commercial licensing. Please contact Karina Edmonds of the California Institute of Technology at (626) 395-2322. Refer to NPO-45213.