

INNOVATIONS IN NEXT GENERATION CB THREAT CHARACTERIZATION AND ASSESSMENT FOR DECISION SUPPORT

Swarpuck - Drone Swarm Enabled Cbrn Sensing

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In our continuing efforts to characterize CBRN threats at three-dimensional (3D) level in communication denied environment, a distributed network of redundant sensors is discussed. Starting on the basis of the previously demonstrated (CBOA '21 and '22) ground level CBRN threat detection system called "DropPuck System", DWT is developing a novel, redundant and low-cost aerial CBRN detection system utilizing small, modular drone mounted sensors (SwarmPucks). Multiple small drones are remotely deployed by the operator via intuitive software and autonomously scan the area of interest for threats. Sensing information collected by the SwarmPucks is integrated via a mapping software showing distribution of contamination and identification of the threat. With a flight time of 10-15min, this technology enables rapid, long-distance TIC and CWA detection while keeping the operator at a safe distance to the threat and provides valuable information to simulation and prediction models. Operation in communication denied environments is enabled through preprogrammed or autonomous drone routing and download of sensing data after return and docking of the drones to the base- and analysis station. Modularity of the SwarmPucks allows disposal of the low-cost sensor nodes at the end of their life, customization of the swarm to the expected threats (2-4 chemicals per SwarmPuck) or gamma radiation detection, and use with other deployment mechanisms (e.g., UGV). As compared to the DropPuck the SwarmPuck has a shorter life (hours instead of weeks) and much smaller size and weight (1in diameter). A new SwarmPuck is used for each mission.

In the future, SwarmPucks will include enhanced capabilities to detect Nontraditional Agents (NTAs) and Pharmaceutical-Based Agents (PBAs). Collection of Biological Warfare Agents (BWAs) in an absorbent media and analysis after return of the drones to the base station will be enabled. A commercial particle detector integrated in BWA collecting Pucks will allow to indicate probable locations of high concentration. To integrate BWA analysis in the base station, DWT is actively looking for collaboration partners with field-ready BWA detector kit. Future work further involves development of GPS independent autonomous flight of the swarm towards areas of (higher) contamination and integration of additional small size weight and power (SWAP) sensors.