

FROM SENSING TO MAKING SENSE

MI-based Classification Of Cb Containing Munitions Or Drones By Radar For Integrated Early Warning

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SRC, Inc. is supporting DTRA and the JPEO to develop Integrated Early Warning technologies using our extensive experience in numerous advanced radar systems including the AN/TPQ-50 Radar system sometimes referred to as the Lightweight Counter-Mortar Radar (LCMR). This radar system, designed, developed, and deployed with custom software for a given mission is a Track-While-Scan (TWS) L-Band Pulse-Doppler radar capable of simultaneous Counterfire Target Acquisition (CTA), and Counter-UAS (C-UAS) operation that provides continuous 360° azimuthal surveillance volume.

SRC demonstrated the capability at Dugway Proving Grounds in October of 2018 to discriminate liquid simulant munitions from conventional HE munitions at or before munition impact allowing for more rapid alerting of Chemical-Biological (CB) threats to the warfighter. Therefore, the AN/TPQ-50 is ideally suited as a central sensor to inform the CBRN Integrated Early Warning (IEW) Operational Environment.

For a recent contract with I2WD, SRC performed the initial steps to integrate the AN/TPQ-50 system with the U.S. Army's IEW system using the Integrated Sensor Architecture (ISA) interface to provide target state vectors & labels/classification for targets, and predicted POO/POI reports for RAM targets to connected C2 systems. This effort included the development of Machine Learning (ML) based classification techniques providing the capability of estimating munition fill during flight (pre-burst) for distinguishing High Explosive (HE) payloads from Chemical/Biological (CB) payloads, along with the development of a target fill classification ability based upon the burst event directly.

In addition, CUAS capability provides automatic classification and alerting capabilities for UAS, Fixed wing aircraft, Rotary wing aircraft, and Bird targets to provide a clear picture of the battlefield airspace and allow for discrimination and alerting of autonomous platforms for mitigation, engagement, and defeat missions of UAS. Adaptation of traditional targets to accommodate CBRN mission objectives for discrimination of UAS outfitted with agricultural sprayers or other CBRN dissemination devices is of interest.

SRC is currently developing a Machine Learning (ML) based target classifier for distinguishing tracks caused by birds from Group 1 and Group 2 UAS with additional effort is being placed into the development of advanced spectral estimation techniques for target classification based upon the micro-Doppler (uD) signature(s) of a target. The approach used can generate a target classifier model using simulated and/or real data and allows for additional target types and labels can be added to the system classifier with only software configuration changes required.

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