Full Name (English):	Dr. Zhe Geng	Recent Photo 
Affiliated Institution and Title (English):	Nanjing University of Aeronautics and Astronautics, China	

Biography
(Please provide in paragraph form within 500 words.)

Zhe Geng received dual B.S. degrees (Magna Cum Laude) in electrical engineering (EE) from Florida International University (FIU), Miami, FL, USA, and Hebei University of Technology, Tianjin, China, in 2012. She received the Ph.D. degree in EE from FIU in 2018 (FIU Presidential Fellowship). From 2018 to 2019, she was a research scientist with Wright State University, Dayton, OH, USA. In Dec. 2019, Dr. Geng jointed the Radar Detection and Imaging Techniques Research Group at Nanjing University of Aeronautics and Astronautics (NUAA) as Research Associate.

Dr. Zhe Geng is the primary investigator (PI) of research projects funded by the National Natural Science Foundation of China and the Natural Science Foundation from Jiangsu Province. Her research interests include deep learning, image processing, and automatic target recognition. She published more than 40 papers in journals and international conference proceedings and is the 2nd author of Radar Networks (CRC press, 2020).

Speech Title (English):

Context-driven automatic vehicle detection and classification in synthetic aperture radar and electro-optical/infrared imagery based on cross-modality multiview feature fusion

Speech Abstract
(Please provide in paragraph form within 500 words.)

To support the research in cross-modality automatic target detection (ATD) and automatic target recognition (ATR), the Radar Detection and Imaging Techniques Research Group at Nanjing University of Aeronautics and Astronautics (NUAA) constructed a proprietary circular synthetic aperture radar (SAR) dataset with self-developed monostatic and bistatic miniSAR systems mounted on drones, and a matching infrared (IR) dataset with a state-of-the-art IR imaging camera. Leveraging these datasets, our research group proposed several deep neural networks for joint SAR-IR ATD and ATR. Experiments show that the proposed networks can fuse the multi-aspect SAR image features effectively, mitigate the impact of the feature diversity across different views.

SAR and IR sensors could provide complementary information regarding the scene under surveillance: the SAR system could pick up the electromagnetic characteristics of the targets while the IR sensor is more effective in extracting the target contours. To tackle the technical complexities involved in multi-view bistatic SAR target feature fusion caused by the aspect-sensitivity and accurately identify targets lacking distinguishable continuous contours, a novel joint SAR-IR ATD-ATR framework with 8-key-sector-view feature fusion module and a multi-view cross-modality network based on the scale invariance property and ensemble learning are proposed. Experimental results show that the proposed strategy could effectively combine the complementary information provided by the SAR systems and IR sensors mounted on distributed drones, leading to impressive performance enhancement over the single-stage baseline models relying on single-modality data.

To deal with out-of-library targets that might be present in practical application scenarios, the scene classification problem and the target recognition problem should be brought into a single framework. To begin, the land-use labels and region masks are generated with the scene segmentation module based on the SAR-EO/IR images to reduce false alarms. After that, target classification is carried out based on the inherent target properties and capabilities reflected by the SAR-EO/IR imagery with the Context-Aware Region Masking and Situation AWareness (CARMSAW) strategy. To compensate for the lack of real measured data, the Cross-modality Real-synthetic Image Merging (CRIM) strategy is employed for feature enhancement. Specifically, to

tackle the random deviations of the real SAR imagery from the ideal ones, the synthetic SAR signature generated based on the target CAD model is treated as a ``skeleton'' with known structure for real-sync target feature alignment. To facilitate the recognition of aircrafts, an ``exoskeleton'' is constructed for the target SAR signature based on the IR imagery, so that the dimension/shape/contour of the target and its electromagnetic features are united. Furthermore, a novel color-guided component-level attention mechanism, in which the SAR image is partitioned into several subregions highlighted or blacked-out adaptively based on their significance level, is discussed.