

**Title:** Accurate Underwater Target Tracking and Sensor Placement Under Realistic Conditions

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**Abstract:** Detection and tracking of underwater targets is a fundamental component in underwater surveillance, search and rescue, and in ocean exploration. Due to the high transmission loss of radio waves passing through water, passive or active sonar is widely used in wide-area underwater surveillance. This talk addresses the problem of underwater target tracking considering realistic environmental conditions based on active sonar. Specifically, we address 1) unknown underwater detection in three-dimensional (3D) space with multipath detections and uncertain sound speed profile in heavy clutter, 2) group underwater target tracking whose motion is dependent on each other when detections are disturbed by unknown structured clutter background, 3) extended underwater target tracking with high resolution sonar in presence of multipath detection and measurement origin uncertainty. We will also address the problem of optimal sonobuoy placement from an airborne platform to maximize coverage and underwater target tracking accuracy.

**Bio:** Dr. Thia Kirubarajan (Kiruba) is a Distinguished Engineering Professor in the Electrical and Computer Engineering Department and holds the General Dynamics Mission Systems (Canada) Industrial Research Chair in Target Tracking and Information Fusion at McMaster University, Canada. He has published more than 165 peer-reviewed journal articles and 250 conference papers, 12 book chapters, one standard textbook on state estimation and four edited volumes. In addition to conducting research at the university, he has been transitioning his work to real systems in collaboration with industry and government partners. His tracking, fusion and resource management software has been integrated into an airborne maritime surveillance fleet, an aircraft carrier, a maritime radar system family, underwater surveillance systems, and advanced driver-assistance systems, in addition to being prototyped for aircraft, UAV and missile defense resource management systems.