PORT SECURITY CSR

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Research Areas

- Acoustic Monitoring of Underwater and Surface Vessels
- Coastal Radar Detection and Satellite Tracking of Ships
- Multi-use capabilities of HF Radar for vessel detection and ocean current mapping
- Harbor Acoustic Monitoring Systems
- Decision Support Systems
- Layered Maritime Domain Awareness
- Resilience Strategies for Port Systems
- Maritime Security Education and Training

Mission: *To conduct innovative research, develop new tools and technologies, and provide relevant maritime security-focused educational programs to enhance our Nation's maritime domain awareness and the technical skills and leadership capabilities of our current and prospective maritime security workforce.*

Quick Facts

- Co-led by Stevens Institute of Technology's Center for Secure and Resilient Maritime Commerce (CSR) and University of Hawaii's Center for Island, Maritime and Extreme Environment Security (CIMES).
- Offers maritime security-centric educational programs tailored to college students and the homeland security workforce.

Research

- CSR's research focuses on enhancing maritime domain awareness through the use of sensor technologies (e.g., acoustics and electro-optics, HF radar and satellites) to form a layered approach to maritime and port security applications. CSR also leverages systems engineering tools and technologies that can be used to enhance the resilience of ports and the marine transportation system.
- CIMES research focuses on the safety, security and protection of extreme and remote environments. CIMES leverages autonomous systems and emerging sensor technology in coastal radars, acoustics and air/space-borne platforms to enhance situational awareness for decision makers and first responders.
- The Center has test beds in New York Harbor, the Caribbean, and the Arctic.

Key Accomplishments

- Received three DHS Science & Technology Impact Awards for providing data and analysis support in the response efforts to the Deep Water Horizon Oil Spill in 2010, the emergency landing of U.S. Airways Flight 1549 in the Hudson River in 2009, and an ice trapped fuel tanker in Nome, Alaska in 2012.
- Completed successful experiments in Miami and the New York Harbor demonstrating the value of a fully-integrated, layered Maritime Domain Awareness approach for over-the-horizon, near-shore and harbor surveillance systems.

- Awarded a 2012 patent for Stevens Institute of Technology's Passive Acoustic Detection System (SPADES).

"Coast Guard Atlantic Area has been fully engaged with the Department of Homeland Security Center of Excellence (DHS COE) program as an extension of the Commandant's 'Power of Partnerships' direction. During and after Super Storm Sandy, members of the Atlantic Area Ops Analysis staff collaborated with the Stevens Institute, which is a DHS COE, on possible port impacts and cargo routing. This summer the same Ops Analysis staff will host a Steven's graduate student for an Internship."

- VADM R.C. Parker
USCG Commander
Coast Guard Atlantic Area

MIREES Highlights

Stevens Passive Acoustics Detection System (SPADES)

SPADES enables detection and classification of underwater and surface threats to ports and high value assets. Developed with grants from the DHS Science & Technology Directorate and the Office of Naval Research, it has been tested in various ports and Navy harbors in the United States and internationally. SPADES received a patent award in 2012.

Port Mapper Tool

Port Mapper is a web-based visualization and decision support tool designed to aid maritime stakeholders in the event of U.S. port closures and disruptions. Port Mapper helps stakeholders develop response and resiliency plans in the event of port and supply chain disruptions and allows end users to conduct scenario-based analysis on the implications and repercussions of disruptions and closures of U.S. ports. The U.S. Coast Guard (USCG) used Port Mapper to determine which U.S. ports could handle cargo containers and their commodities from those ports that were impacted by Sandy.

Unmanned Port Security Vessel (UPSV)

The UPSV provides a rapid inspection capability in port environments, integrating multiple sensors such as high-resolution bathymetry sonars and chemical sensors as well as remote command and control for real-time operation and supervision. The UPSV supports multiple missions including inspection of infrastructure above and below the water line, response and recovery of port operations, and underwater change detection and threat assessment for piers, pilings and harbor seafloor. The vessel is deployable by helicopter allowing for rapid response time to disasters or threats within hours. Likely end users include USCG, harbor masters and commercial port operators.

HF Radar Real-Time Vessel Detection and Ocean Current Mapping

MIREES researchers are developing algorithms to use High Frequency (HF) Radar signals to improve real-time vessel detection. HF Radar systems show significant promise toward increasing detection rates in multi-vessel environments. Recent experiments in the New York/New Jersey harbor showed that MIREES's HF Radar system and enhanced algorithms found that one out of three vessels were not appearing in the Automatic Identification System. In addition, since 2009, the USCG has been using MIREES's HF Radar surface current data in their search and rescue missions.

Remote Power Module (RPM)

The RPM is an autonomous power and communications system that enables collection of Automatic Identification System (AIS) and ocean surface current data in remote locations. This fully-automated, hybrid power station for arctic and sub-arctic maritime environments can power radar and communications systems in remote areas along the Alaskan coast, which provides a needed capability improvement for the USCG.