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INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY®



**MARITIME
SECURITY CENTER**
A DEPARTMENT OF HOMELAND SECURITY CENTER OF EXCELLENCE

Maritime Security Center (MSC) Virtual Annual Meeting May 13, 2020

Hady Salloum
Stevens Institute of Technology
www.Stevens.edu/MSC

CIRI | CRITICAL INFRASTRUCTURE
RESILIENCE INSTITUTE
A DEPARTMENT OF HOMELAND SECURITY CENTER OF EXCELLENCE

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Our Mission

Mission: Established in 2008 as a DHS Center of Excellence with a 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, the resiliency of our Marine Transportation System (MTS) and the technical skills and leadership capabilities of our current and prospective maritime security workforce.

Stakeholders: U.S. Coast Guard, Customs and Border Protection, DHS S&T Directorate, Local, state and municipal law enforcement and emergency responders

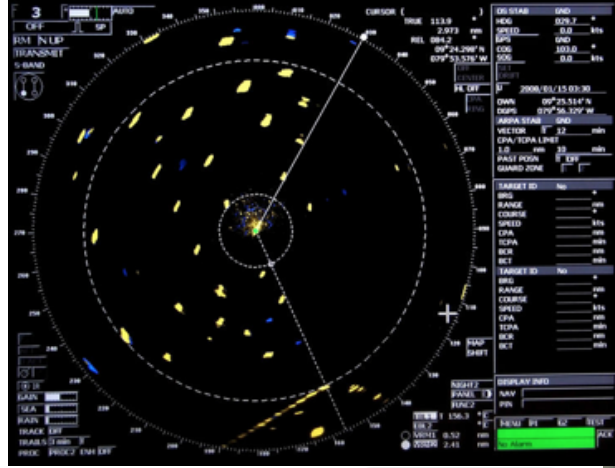
Research Focus

- Maritime Domain Awareness
- Sensor technology development
- Threat signature characterization
- Data analysis and integration
- Real-time information delivery
- Maritime Resilience and Risk



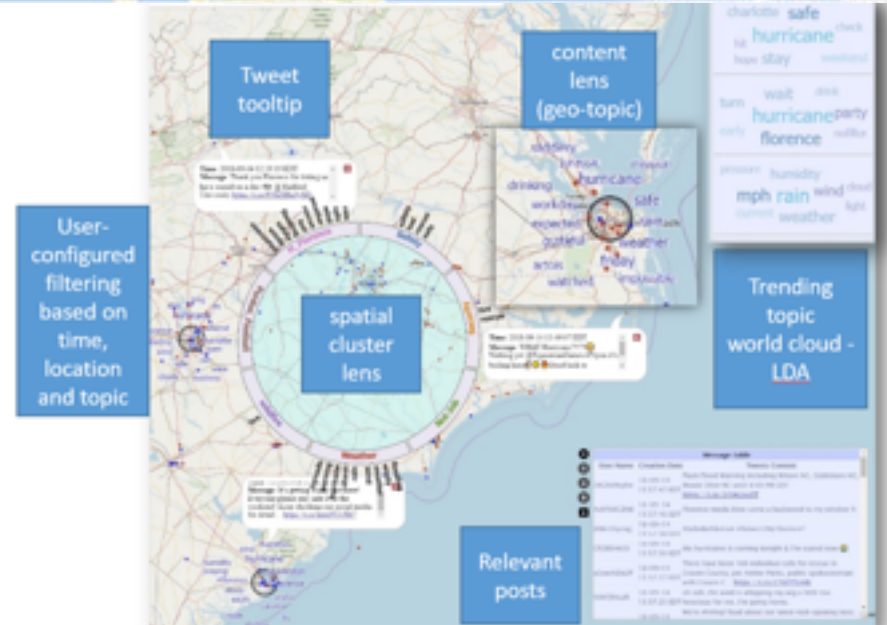
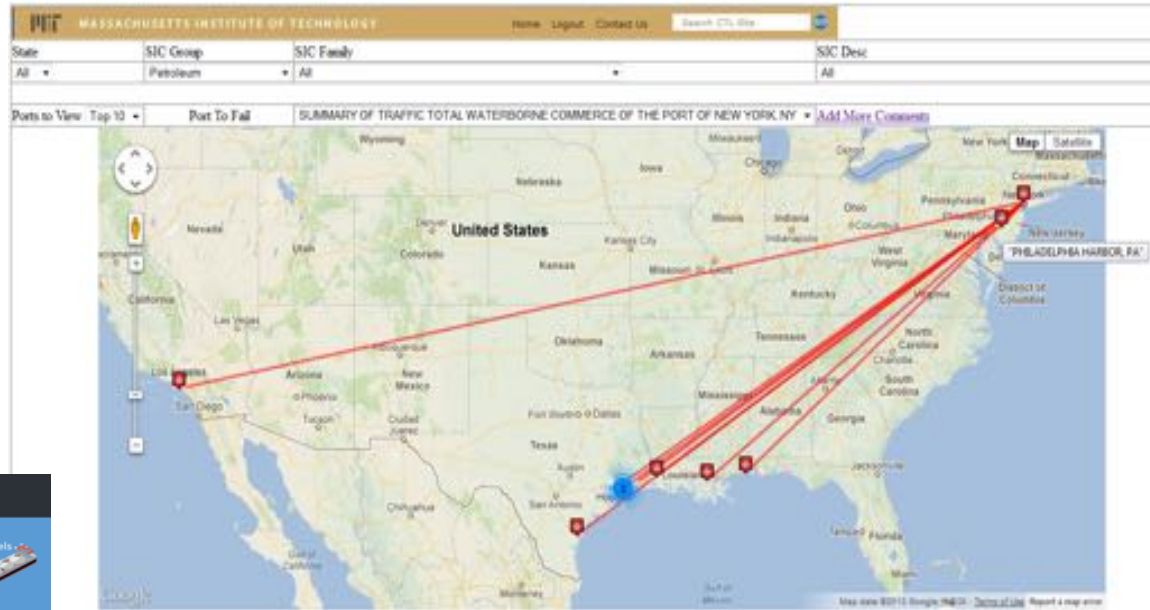
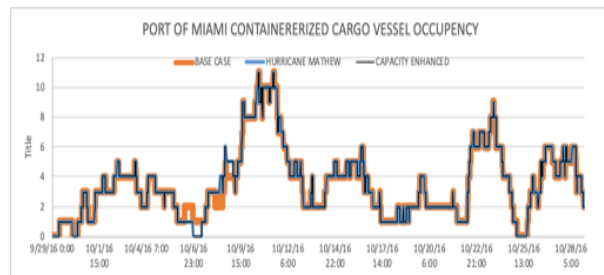
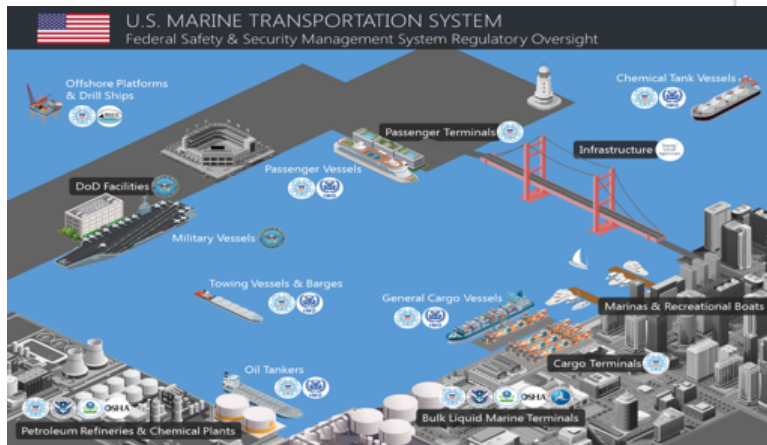
Current Research

- Low Cost Covert Sensors for Remote Locations
- RF Surveillance of Vessels with Illegal Activity
- VTS Radar for Small Vessel Detection
- Safety and Security in Remote Bridge Operations
- Counter UAS Supporting DHS S&T T&E (BOA Task Order)



Past Research

- Maritime Resilience
- Port and Network of Ports Modeling
- Port Mapper
- Predictive Port Resilience Tool
- Maritime Cyber Security
- Enhancing Situational Awareness from Social Networks



Educational Programs

- Coordinated STEM Internship Program
- Summer Research Institute
- Research Assistantships
- Maritime Cyber Security Professional Development Course
- MSI Educator Workshops



Research Transition

Patented and Licensed:

- Passive Acoustic Diver Detection System

Patented & Licensed:

- Low Flying Aircraft Detection

(including training manuals and Level 2 drawings and documentation)

Patent Pending:

- Detection of Invasive Species at Ports of Entry

(BioSecurity Challenge for Maritime Shipping and USDA)

Field-base use of MSC Technologies:

- GPS Real Time Trackers widely used by DHS and DoD



Recent Publications (see [Stevens.edu/MSA](https://stevens.edu/MSA))

- Sedunov, Alexander, Haddad, D., Salloum, H., Sutin, A., Sedunov, N., and Yakubovskiy, A., **Stevens Drone Detection Acoustic System and Experiments in Acoustics UAV Tracking**, 2019 IEEE Symposium on Technologies for Homeland Security (HST), Woburn, MA, 5-6 2019.
- Donatelli, Nicholas, Flynn, T., and Macari, M., **A Lightweight, Low-Cost, Wideband Software-Defined Radio Test Bed**, 2019 IEEE Symposium on Technologies for Homeland Security (HST), Woburn, MA, 5-6 November 2019.
- Sutin, Alexander, Yakubovskiy, A., Salloum, H.R., Flynn, T.J., Sedunov, N. and Nadel, H., 2019. **Towards an Automated Acoustic Detection Algorithm for Wood-Boring Beetle Larvae** (Coleoptera: Cerambycidae and Buprestidae). *Journal of Economic Entomology*, 112(3)
- Alexander Sedunov, Hady Salloum, Alexander Sutin, Nikolay Sedunov and Sergey Tsyuryupa, **UAV Passive Acoustic Detection**, 2018 IEEE International Symposium on Technologies for Homeland Security (HST), Crystal City, VA, 2-3 May, 2018.
- Alexander Sedunov, Hady Salloum, Alexander Sutin and Nikolay Sedunov, **Long-term testing of acoustic system for tracking low-flying aircraft**, 2018 IEEE International Symposium on Technologies for Homeland Security (HST), Crystal City, VA, 2-3 May, 2018.
- Salloum, Hady, Alexander Sutin, Alexander Pollara, **Detecting Illegal Fishing Activity with Acoustic Technology | Passive acoustic methods help USCG fight illegal fishing**, U.S. Coast Guard Proceedings, USCG Proceedings, Vol75 No1 Spring 2018
- Sutin, A., Salloum, H., Sedunov, N., Sedunov, A., Merzhevskiy, A., Tsyuryupa, S. and Francis, C., 2019, January. **Microphones on drones-Perspectives for soundscape**. In *26th International Congress on Sound and Vibration, ICSV 2019*. Canadian Acoustical Association.

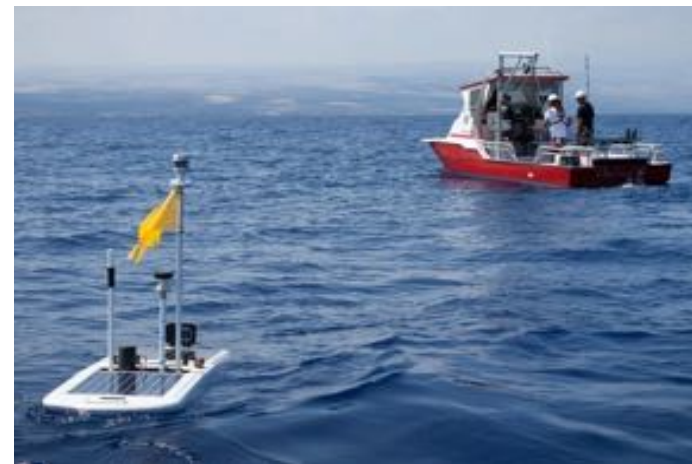
Prospective Research Projects

- Investigation of Anomalous Behavior of Small Pleasure Craft Based on their Weight
- Impact of Wind Energy Projects on USCG Search and Rescue Operations
- Anomaly Vessel Detection Based on Maritime Digital Communication Data Analysis
- Vulnerability of Marine Navigation Systems to Electromagnetic Pulse and Geomagnetic Disturbances & Mitigation Technologies
- Global Navigation Satellite System Quality Monitoring
- Extending the Range of AIS



More Research Project Ideas

- Smart Acoustic Buoy
- Sensors for Unmanned Surface Vessels (USVs)
- Detection of GPS embedded in Contraband
- UAS-based Vessel Inspection
- Cell Phone-Based Sensors
- Means to Communicate in Hazardous Conditions



Outreach and Stakeholder Engagements

- Monthly Status Update Emails and Quarterly Newsletters
- USCG Committees
 - National Maritime Security Advisory Committee (NMSAC)
 - Sector NY AMSC Cyber Security Subcommittee
 - Project Evergreen
- Hosted: DHS I&A Security Symposium and Technology Foresight Forum
- Collaborated with other COEs for Joint Proposals, Proposal Reviews and COE Summit coordination.



Any Questions?

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This material is based upon work funded by the U.S. Department of Homeland Security under Cooperative Agreement No. 2014-ST-061-ML0001. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Department of Homeland Security.