THE
UNIVERSITY
OF RHODE ISLAND

College of Engineering

DOD SBIR/STTR 2022

College of Engineering, University of Rhode Island

Overview

The College of Engineering at the University of Rhode Island is housed in two main facilities, the Fascitelli Center for Advanced Engineering and the Ocean Engineering Bay Campus, which combined provide more than 250,000 sq/ft for research and academic activities. Currently, there are two large research centers: The National Center for Undersea Vehicle Technology (NIUVT) and the Cyber-Physical Intelligence and Security Center (CYPHER). The Engineering Core Facility (https://web.uri.edu/nano/) contains state-of-the-art material characterization and analysis instrumentation.

Related to this solicitation, the following expertise can be found at the URI College of Engineering:

- Sensor development, RFID Sensors, Passive and Active Wireless Sensors
- Modeling of chemical effects on mechanical properties, chemo mechanics
- Corrosion mechanics, failure analysis, adhesive bonding
- Modeling, Simulation, Optimization, Design, and Analysis
- Geospatial analysis/modeling using satellite information
- Share Wave Velocity
- Experimental Geomechanics
- Microstructure and Material Modeling, Fracture Mechanics
- The behavior of Structures Under Extreme Events, Vibration Control for Wind and Seismic Effects
- Array Signal Processing, Estimation and Detection Theory
- Microelectronics and Semiconductor Materials
- Cyber-Physical Systems, System/Network Security
- Aerial Robotics, Multi-Robot Systems, Mechatronics, Motion Control
- Machine Learning and Data Mining
- Damage Evolution Following High-Velocity Impact, Dynamical Systems Perspective on Fatigue Evolution
- Supply Chain Modeling, Manufacturing Optimization/Layout
- Dynamical Pattern Recognition and Classification, Distributed Control of Multi-Agent Systems
- Underwater Acoustics, Acoustic Signal Processing, Geoacoustic Inversions, Marine Mammal Observing with Mobile Platforms, Ocean Variability and Effects on Acoustic Propagation, Acoustic Navigation of Gliders
- Hydrodynamics, Fluid-Structure Interactions, Naval Hydrodynamics
- Marine Robotics, Compliant Underwater Manipulation

Contact: Vinka Oyanedel-Craver, Associate Dean for Research, craver@uri.edu

Detailed research expertise (partial list)

RIN2 @ URI: The Rhode Island Consortium for Nanoscience and Nanotechnology (RIN2) at the University of Rhode Island is a multi-user materials characterization facility looking to work with industry partners. RIN2 offers high-end, state-of-the-art equipment for the material and device microscopy and microanalysis. RIN2 is professionally staffed and provides training opportunities for its academic and industrial users.

Major equipment available in RIN2 is listed below. These techniques can be used, for example, to:

- Measure step size and pitch in diffraction gratings
- Verify coating thickness and homogeneity
- Evaluate surface roughness, porosity, and changes in the morphology of polymers, ceramics, metals
- Evaluate liquid or gel penetration through porous networks
- Analyze the elemental and molecular composition of raw materials, manufactured parts
- Create 3D models of devices for multi-physics simulations

RIN2 follows a fee-per-use model, with user rates at web.uri.edu/nano/rates. The director is adjunct faculty in Chemical Engineering. SBIR/STTR partners can access RIN2 by partnering directly with RIN2 director Dr. Irene Andreu, partnering with other URI research groups (internal user rates), or contracting the facility as an external user (external user rates, assisted rate if staff runs specimens).

Please contact RIN2 director Dr. Irene Andreu iandreu@uri.edu if you want to know more about the facility's capabilities.

Solicitations: AF221-0006, AF221-D003, AF221-D009, AF22A-T002, MDA22-001, N221-013, N221-066, N221-085, N221-084, N221-086, N22A-T019

Dynamic Photo-Mechanic Laboratory: The lab is spread across more than 5000 sq. feet area, located in two buildings and supplemented by URI workshop equipped with state-of-the art machining facilities

- Universal Testing Equipment: Load cells 5KN, 10KN, 100KN, 250KN
- Specialized Experimental setups: High-Pressure Underwater Experiment, Underwater Explosive (UNDEX), Accelerated High pressure Aging
- High speed Photography and DIC setups: FASTCAM NOVA S12, IMACON 200, Shimadzu HPV-X2, Photron Fastcam SA 1.1
- Specialized fabrication and material testing: Water Jet cutter, Weathering facilities, 3D Printer, Electromagnetic Force Fatigue and Endurance Testing System, High Speed Puncture Impact Testing Machine, High Speed Puncture Impact Testing Machine with Thermostatic chamber, Dynamic Mechanical Analysis, Shock Tube

Musa Jouaneh: Professor of Mechanical Engineering at URI (jouaneh@uri.edu). He has expertise in the following areas: development of automated assembly, cutting, and inspection systems; system integration of robotics and automation systems; modeling the response of various types of systems; and development of technology-based educational tools. He has worked with many industrial sponsors on numerous projects in these areas.
Solicitations: N221-009 and N22A-T023

Ali Akanda: Professor of Civil and Environmental Engineering at URI (akanda@uri.edu). His group is currently developing machine learning (ML) algorithms to deconvolve satellite-derived microwave (AMSR-E) sea surface temperature (SST) fields via collocated infrared (MODIS) observations. Additionally, we are working on a predictive machine learning (ML) framework that will train on large-scale land surface parameters, seasonal to sub-seasonal forecasts, synoptic-scale hydrological observations from space,

and high-resolution commercial datasets to identify areas of high wildfire risk and associated environmental impacts.
Solicitation: N22A-T024, OSD221A-002

Jim Miller and Gopu Potty: Professors Ocean Engineering (miller@uri.edu, gpotty@uri.edu). They perform research in underwater acoustics, signal processing, and acoustical oceanography. They have expertise in the effects of the seafloor on acoustic propagation and use inverse techniques to infer the properties of the bottom. They have extensive experience in experimental ocean acoustics in shallow and deep water. They use several different types of instrumentation to do their research, including acoustic transducers, hydrophones, geophones, and laser Doppler velocimeters. They also study the effects of anthropogenic sound on marine life. Their research has been sponsored by the Office of Naval Research, Army Research Laboratory, NASA, BOEM, and US Fish and Wildlife. Miller co-founded FarSounder, Inc., which provides 3D forward-looking, obstacle-avoidance sonars to commercial and military vessels, cruise ships, and large yachts.