

American Nuclear Society Robotics and Remote Systems Division Webinar



Development of Robotic Technologies for Nuclear Decommissioning 29 April 2025 ANS Webinar, USA



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Applied
Research

Florida International University







Florida International University

A vibrant, 58,000 student-centered public research university located in Miami, Florida.

Among the largest Hispanic-serving institutions in the U.S. and is designated a Minority-Serving Institution.

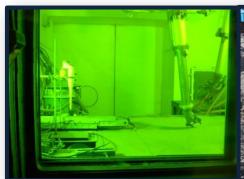
As a top-tier research institution, research is a major component in FIU mission.





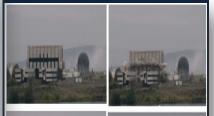


DOE Office of Environmental Management (DOE EM) and Office of Legacy Management (DOE LM)













DOE's Environmental Restoration Mission:

DOE Office of Environmental Management has over 30 years managing and directing the cleanup of contaminated nuclear facilities across the United States due to the legacy of R&D and production of nuclear weapons (i.e. Nuclear Weapons Complex)

DOE Office of Legacy Management is committed to fulfilling DOE's post-closure responsibilities and ensuring the future protection of human health and the environment



	Technology Roadmap		2020	2021	2022	2023	2024
	Min	litover	In-house eployment	Site Deployment	Deployment Hanford Tank Farm AP-105 Double Shell Tank	Technology Transferred	
Tank Farm Hanford	Late	ral Gamma		Integration	Deployment WRPS Cold Test Facility	Deployment WRPS Cold Test Facility	Site Deployment
	Off-	Riser Sampler			Design	Integration WRF	Deployment PS Cold Test Facility
		g-Term veillance	Conceptual Design	Sensor Integration	Evaluation	Demonstration WRPS Cold Test Facility	Site Deployment
H Canyon SRNL	Wall	Crawler	Conceptual Design	Sensor Integration	Evaluation	In-house Deployment	Site Deployment
WIPP	Salt	Closure			In-house	Deployment	
	Insp	ection	Evaluation	Integration Deployment	Deployment	WIPP	
Rifle Cell LM	Aeri	ial Lidar	Evaluation	Rifle Disposal Cell (Colorad	0)	Deployment	2
	Gro	und Radar		Evaluation 🗸	Integration 🕢	Mexican Hat Disposal Cell (Utah) WIPP Carlsbad (New Mexico) Rifle Disposal Cell (Colorado)	
Wearable SANDIA	Exos	skeleton		Conceptual Design	Integration	Integration	Site Deployment





Hanford's Tank Farm









77 TOTAL TANKS

49 SINGLE-SHELL TANKS Constructed 1943-1964

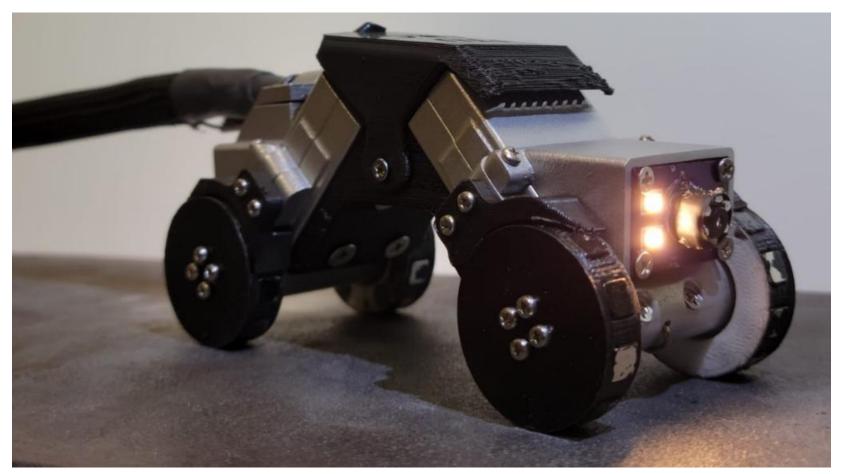
28 DOUBLE-SHELL TANKS
Constructed 1968-1986

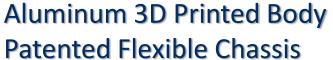
Hanford site has 56 million gallons of radioactive waste left from the past production of nuclear weapons. The HLW is being stored in underground tanks



Miniature Rover Inspection Tool for DST Inspections







Control Box Game Controller





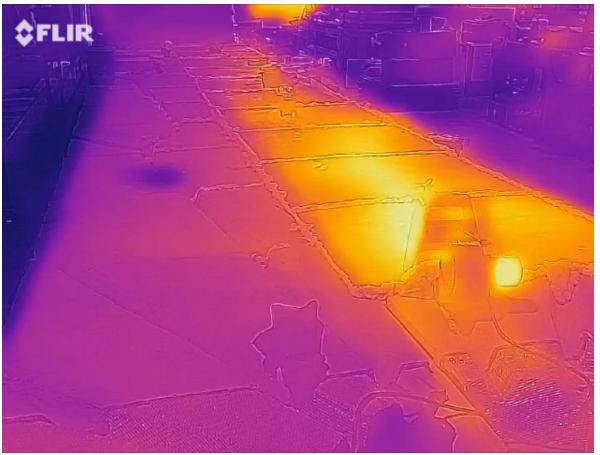






FIU Test Bed – Hanford Double Shell Tank









Traversing weld seams Elevated Temperatures

Extensive in-house testing duplicating DOE site conditions



WRPS's Cold Test Facility Training – Mach 2022













AP-105 Double Shell Tank Deployment – March 2022



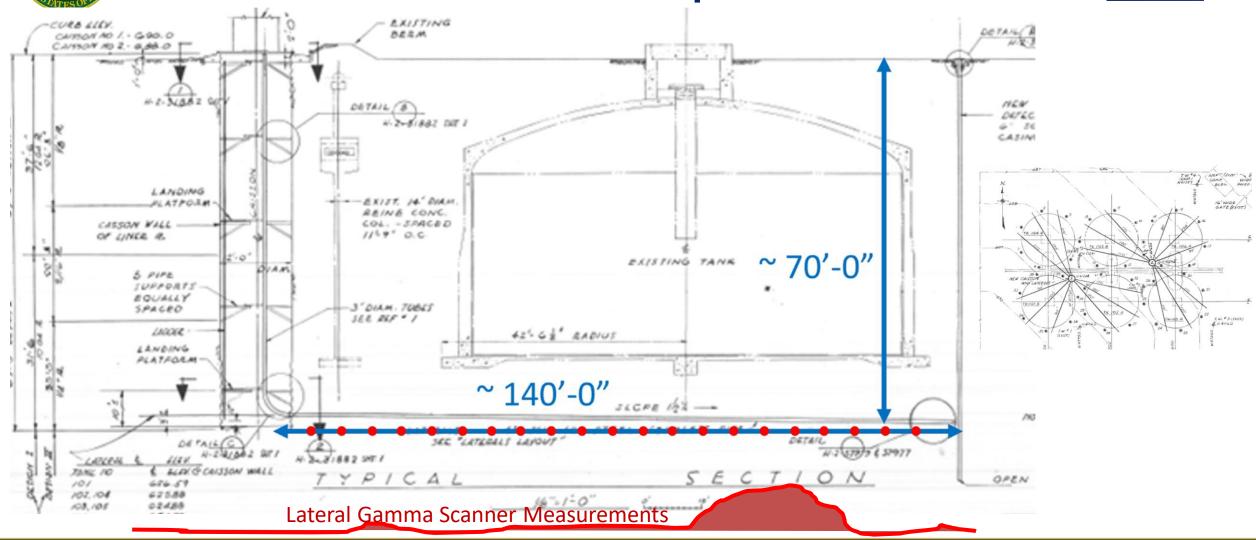






Single Shell Tanks Lateral Gamma Scanner Automated Inspection









Single Shell Tanks Applications WRPS Cold Test Facility Deployment









Field Site - WRPS Cold Test Facility - Summer 2023









Hanford Site Pit Area













Hanford's Pit Area Repairs

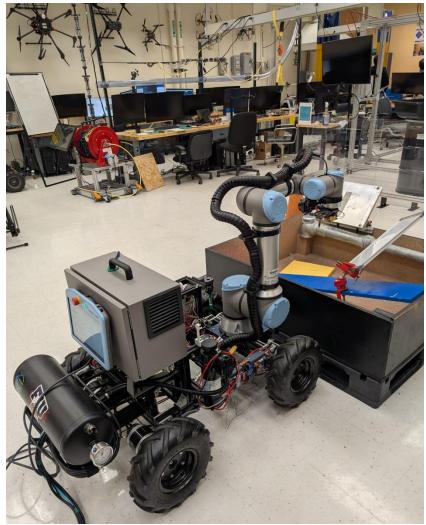






Semi-Autonomous Repair Using Mobile Manipulator and Plug-and-Play Tooling



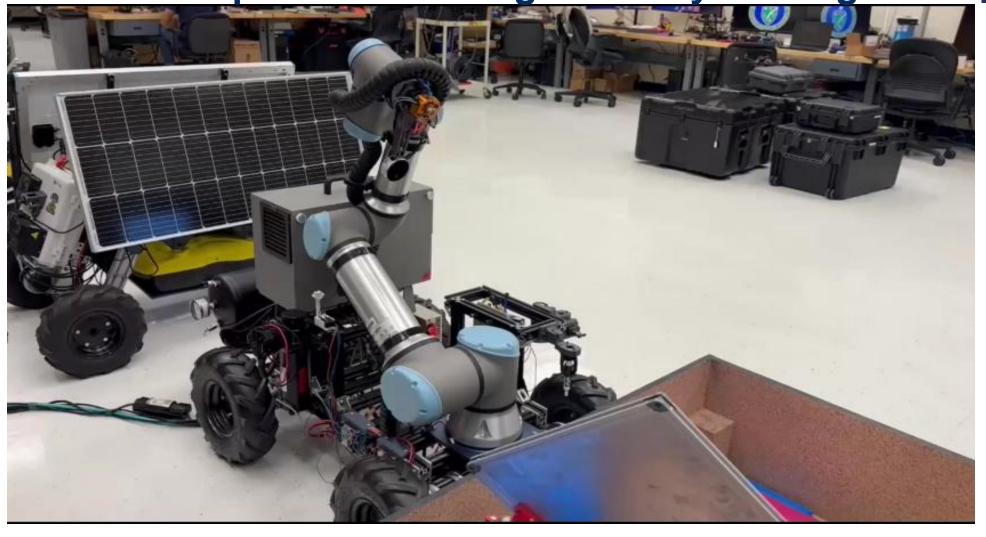






Semi-Autonomous Repair Using Mobile Manipulator and Plug-and-Play Tooling







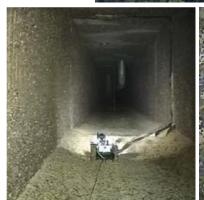
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SRS H-Canyon Concrete Wall Repair















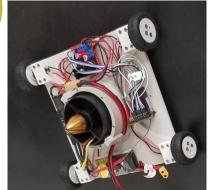


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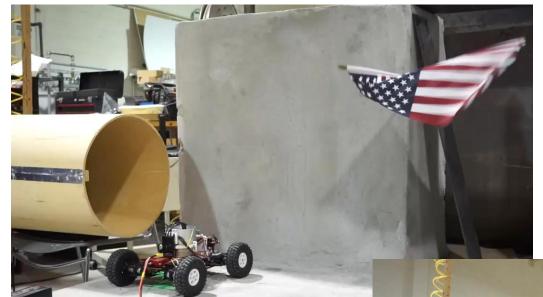
H-Canyon Concrete Wall Repair Prototype















Digitalization in Decommissioning



- Facilitates virtual walk downs by developing 3D models and digital environments (Digital Twins)
- Supports the development of VR/AR for training
- Supports the various stages of decommissioning (characterization, inventory, decontamination, size reductions, waste management and disposal)
- Trimble X7 3D LiDAR (Light Detection and Ranging) is used to develop high quality 3D point cloud scans using laser beams
- The SPOT robot is used to navigate indoor/outdoor environments
- Kromek Sigma 25/50 Gamma detector
- Data post-processed by using various software tools (i.e. AutoDesk ReCap, SCENE "video Pro)







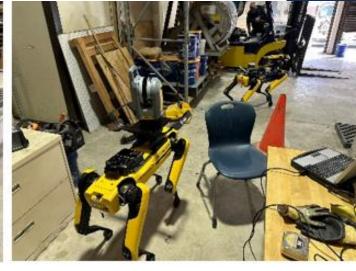


Robot Collaboration















Advancing the research and academic mission of Florida International University.









Thank You

