



United States
Department of Energy
National Nuclear Security Administration
International Nuclear Security

INS Testing and Evaluation Efforts

Sandia National Laboratories is a multitechnology laboratory managed and operated by National Technology and Engineering Solutions of Sandia LLC, a wholly owned subsidiary of Honeywell International Inc. for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525

SAND2024-10634PE



**International
Nuclear Security**
Reducing Risk of Nuclear Terrorism

2022 Tethered UAS Testing

- Tethered uncrewed aerial/aircraft systems (TUAS) allow for long-duration aerial operations to provide extended and enhanced security and situational awareness.

Project goal: Test several available commercial-off-the shelf (COTS) TUAS systems to:

- verify and evaluate manufacturer specifications such as tether length, power output, and physical or software interfaces.
- evaluate operational performance and limitations.



2022 Handheld RF Jammer Testing

- Protection and Response Forces have immediate need for tools to protect against uncrewed aircraft systems (UAS).
- Radio frequency (RF) handheld jammers are:
 - Widely available commercial-off-the-shelf products
 - Reasonably low cost compared to other types of counter-UAS (~\$40k USD)
 - Portable, rifle sized or smaller
- Test several widely available, popular handheld jammers against a range of UAS platforms/RF frequencies to:
 - Estimate the effective range for given pilot locations
 - Verify RF characteristics
 - Evaluate practical operational advantages and limitations



2022 UAS Cyber Testing

- Purpose: Confirm whether a UAS can be used as a tool to attack physical security system components.
- COTS networking equipment and COTS UAS with simple payload attachment
- Had success penetrating a mock physical protection system.



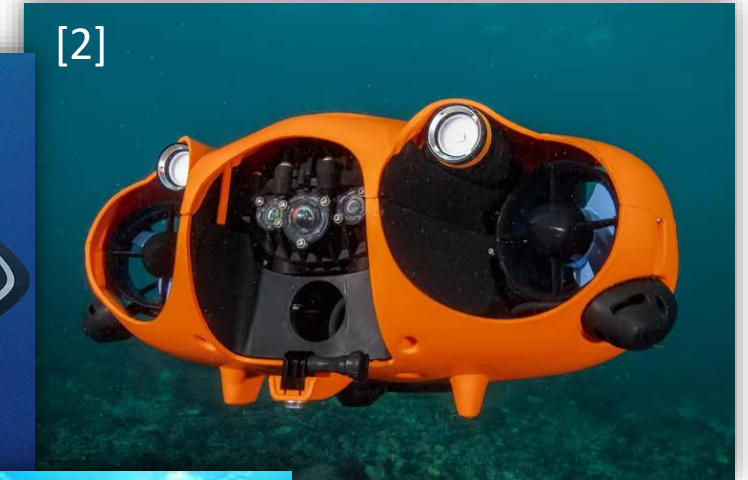
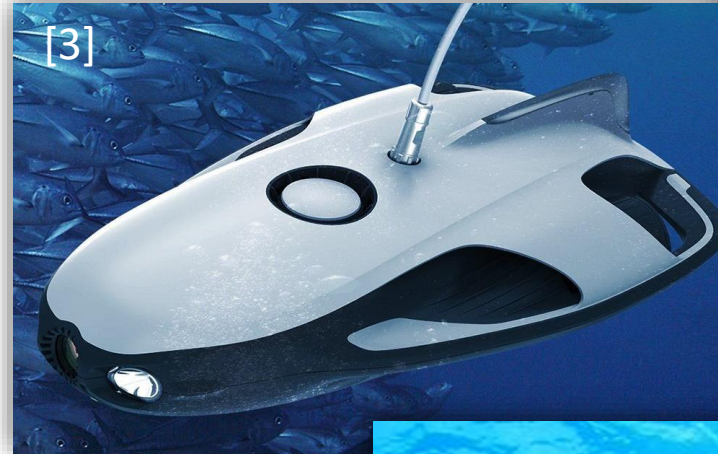
2023 UAS Emulator Testing

- Purpose: Evaluate COTS UAS RF emulator to understand performance and operational effectiveness.
 - Use at facilities or test locations where obtaining approvals to fly a UAS is difficult.
 - System has multiple communication protocols for multiple UAS.



2023 Uncrewed Underwater Systems (UUS)

- Purpose: Evaluate whether evolving underwater systems pose a credible threat to critical infrastructure.
- Evaluation will include both tethered and untethered systems to determine:
 - what an adversary can do with these types of systems
 - If there are now entry points that were previously not a concern



2023-2024 Evaluation of New Remote Identification Systems

- Purpose: Evaluate COTS remote ID receivers and transmitters to learn and understand uses and limitations
- Tests will include multiple COTS receivers and transmitters to evaluate:
 - Range, ease of use, probability of detection
 - Environmental conditions that could affect detection range



2023-2024 UAS Dropping Mechanisms

- Purpose: Create and recreate dropping mechanisms using COTS UAS to evaluate:
 - Effectiveness and ease of use
 - Whether CUAS systems can identify modifications
 - Capability/skill of the adversary to design and pilot



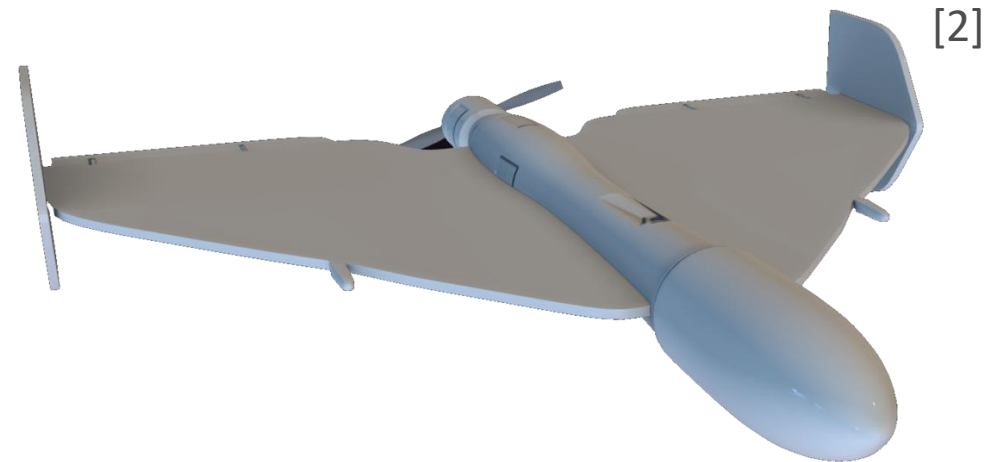
2023-2024 Drone on Drone Kinetic Interceptor CUAS for Nuclear Facilities

- Purpose: Determine if a Drone on Drone CUAS solution is a viable option for nuclear facilities and evaluate its effectiveness against large drones (10kg+):
 - Utilize key aircraft to determine effectiveness



2024 UAS Threat Systems Study

- Purpose: Address what is reasonable to expect a commercial facility to protect against:
 - Given the evolving threat and limitations with CUAS can we identify when military-level counter measures are needed
 - Thoughts?



2024 Design, Build, and Test Physical Protection Barrier

- Purpose: Design, build, and test physical protection barriers to determine if they can stop drones and payloads dropped from drones
 - Multiple barriers and materials will be tested
 - Multiple payloads and drones will be tested against the barriers



2024 UAS Miles Gear Live Exercises

- Purpose: Determine if targeting a UAS with a firearm is feasible and calculate probability of successfully hitting a UAS.
 - Incorporate Multiple Integrated Laser Engagement System (MILES) receivers onto UAS to test effectiveness



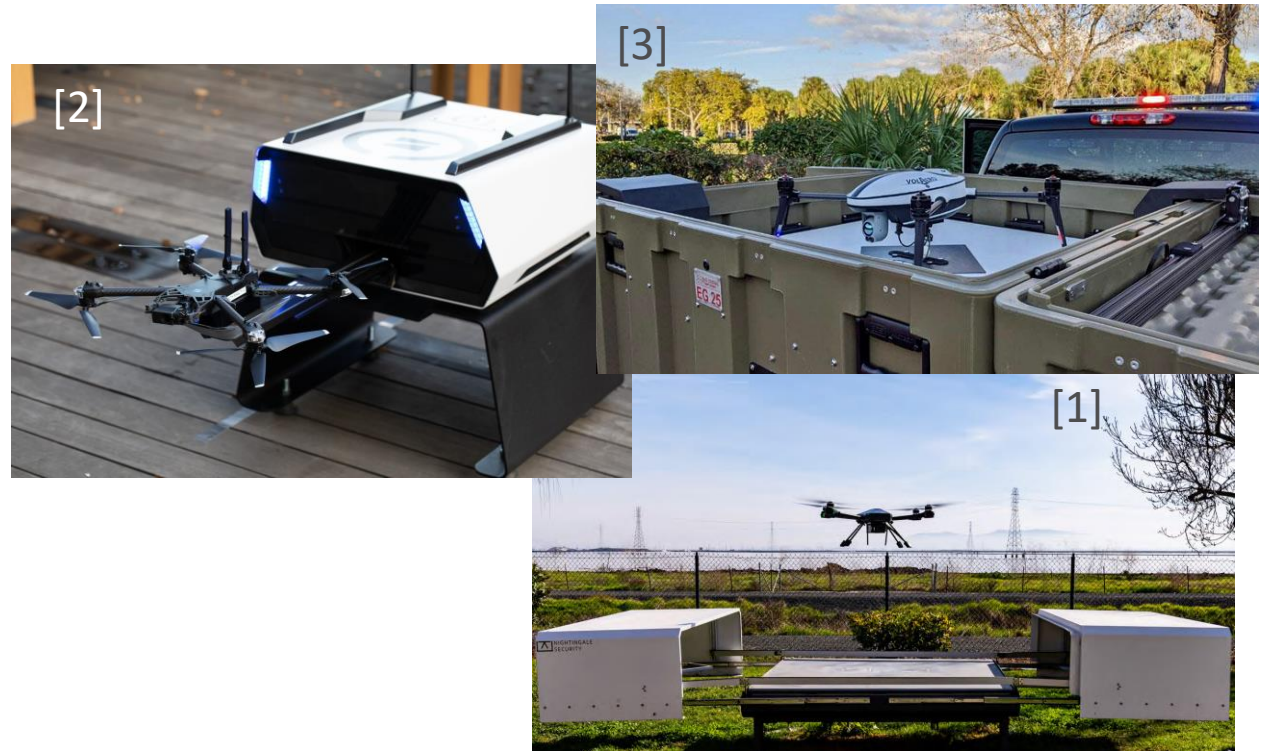
2024 Uncrewed Ground Vehicles (UGV's)

- Purpose: Evaluate whether evolving UGV's pose a credible threat to critical infrastructure.
- Evaluation will include both GOTS and COTS systems to determine:
 - what can an adversary do with these types of systems
 - If there are now entry points that were previously not a concern



2024 Drone In a Box (DIB)

- Purpose: Evaluate the performance and operational effectiveness for integration into nuclear security response
- Evaluation includes COTS systems to determine:
 - Installation difficulty and duration
 - Flight performance
 - ▶ Range, response time, weather impacts, etc.
 - Operational effectiveness
 - ▶ Number of operators required
 - ▶ Ease of use



2024 Racing Drone Accuracy

- Purpose: Evaluate the accuracy an operator can achieve with a racing drone when flying into a target. Operators range in skill level from beginner to expert.
- Evaluation includes COTS racing drones (\$500) and will determine:
 - What skill level is required by an operator to hit a static and moving target
 - How precise can an operator be with a racing drone when aiming at a target



Ongoing Build and Test Reproductions of Key Aircraft

- Purpose: Recreate key aircraft from regions of interest to test difficulty to build, pilot skill level needed to operate, CUAS detection effectiveness:



For more information about our UAS Team and partnership support, contact INSinfo@nnsa.doe.gov



INS International
Nuclear Security
Reducing Risk of Nuclear Terrorism