Labs of the Lab

APL Staff Writers

The Johns Hopkins University Applied Physics Laboratory (APL) creates technologies and innovations that serve national priorities and expand the frontiers of science. By combining creativity and technical expertise with a culture of risk-taking—brought together in cutting-edge collaboration spaces, labs, and test facilities across its campuses—APL's researchers tackle increasingly difficult challenges with impacts across multiple domains. This article, the first in a recurring series, highlights just a few of the specialized laboratories enabling APL staff members' critical contributions to the Lab, its sponsors, and the nation.

NAMI

The NAMI facility is a first-of-its-kind laboratory that unlocks the power of biology for national and environmental security. With aquariums sized from 10 to 1,000 gallons and the capability to make up to 10,000 gallons of its own seawater per day, the 3,000-square-foot space is home to a wide variety of organisms—from barnacles and mussels to crabs, coral, and algae species. While much of the work in NAMI (short for tsunami) focuses on national security challenges, researchers are also tackling issues related to climate change, studying the environmental impact of technologies such as antifouling coatings, and performing basic research of organisms in controlled settings. The facility enables myriad opportunities for environmental research and connects the Research and Exploratory Development Department with other sectors and departments across the Lab, particularly the Force Projection Sector. For more information, contact Tom Lawton (thomas.lawton@jhuapl.edu).

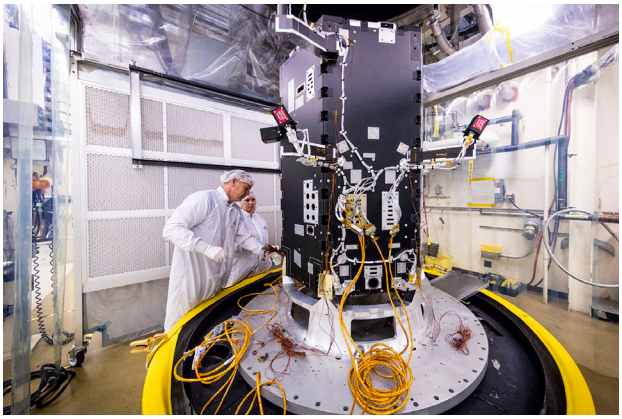
SPECIAL FEATURE

INTELLIGENT SYSTEMS CENTER (ISC)

The ISC radically enhances APL's ability to develop algorithms and machine teammates for human operators. The center leverages APL's broad expertise across defense, intelligence, homeland protection, space exploration, and health care to fundamentally advance the employment of intelligent systems in real-world settings—and in ways that benefit the nation. For more information, contact Bart Paulhamus (bart.paulhamus@jhuapl.edu) or David Patrone (david.patrone@jhuapl.edu) or visit the ISC website, https://www.jhuapl.edu/isc/facility.

DRAGONFLY FLIGHT LAB

In the Dragonfly Flight Lab, engineers are developing the flight control system and navigation algorithms for NASA's Dragonfly rotorcraft-lander mission to Saturn's exotic moon Titan. The indoor facility has a 900-square-foot flight area for testing, integration, and maintenance of two half-scale Dragonfly flight vehicles and a thrust test stand made for experimenting with algorithms and informing simulation models with actual data. Scheduled to launch in 2027, Dragonfly is a revolutionary mission concept that marks the first time NASA will fly a rotorcraft for science on another planet. For more information, contact Jason Stipes (jason.stipes@jhuapl.edu).

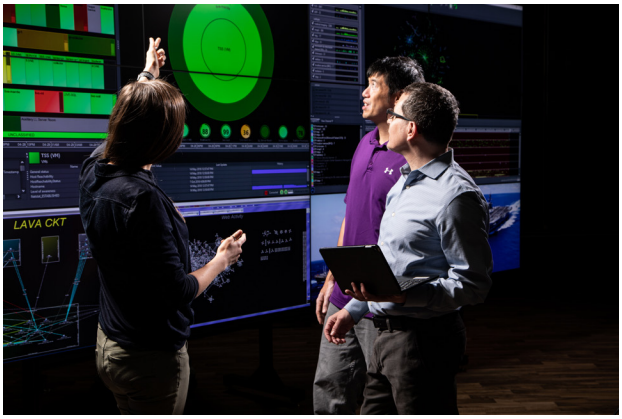


SPACE SIMULATION AND VIBRATION TEST LABS

This facility provides laboratories, instrumentation, and data acquisition capabilities for thorough electromagnetic interference/compatibility, thermal/vacuum, and static/dynamic environmental testing of flight hardware at all levels of assembly. The Space Simulation Laboratory replicates the operating conditions of space, and engineers use the Vibration Test Laboratory to perform structural qualification testing to ensure space systems can withstand the rigors of launch and operation. Our testing philosophy—test as you fly, fly as you test—has enabled the remarkable longevity of APL's spacecraft and instruments. For more information, contact Hadi Navid (hadi.navid@jhuapl.edu).

LIVE DATA, INTEGRATION, VALIDATION, AND EXPERIMENTATION (LIVE) LAB

The LIVE Lab allows researchers to visualize data on information networks and use automated pattern recognition to discover anomalies that indicate cyberattacks. LIVE Lab features a suite of tools to help cyber operators detect, understand, and respond to cyberattacks across many platforms and applications. For more information, contact Jan Calianno (jan.calianno@jhuapl.edu) or Liz Campbell (lisbeth.campbell@jhuapl.edu).



AUGMENTED REALITY ENVIRONMENT AT APL (ARENA)

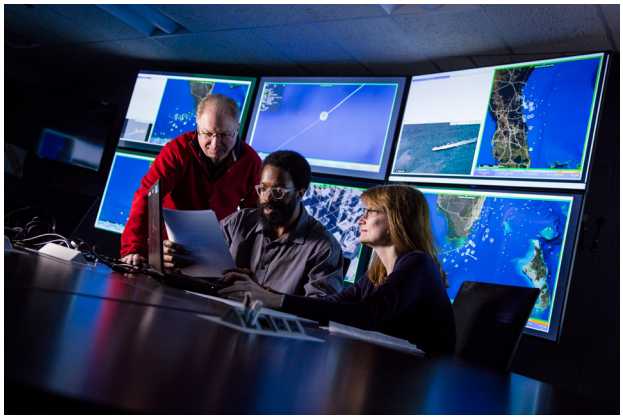
ARENA is a visual-simulation test and demonstration facility, made to showcase the interactive virtual environments that APL develops for military training. For example, the Virtual Instructor Project, which can train sailors to launch weapons from submarines, can be displayed across the multitude of screens in the room to provide an immersive demonstration of the application. For more information, contact Paul Biegel (paul.biegel@jhuapl.edu).

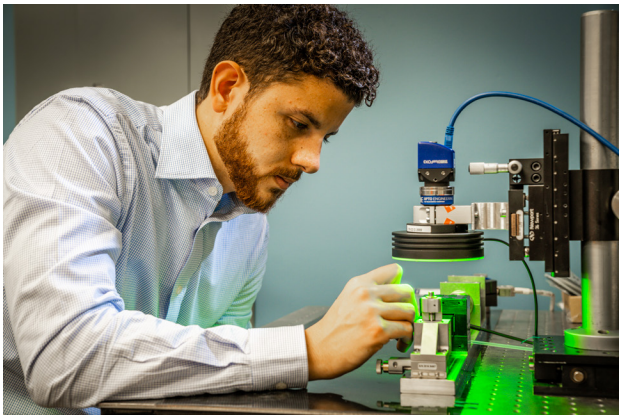
COMBAT SYSTEMS EVALUATION AND MINOTAUR LABORATORIES

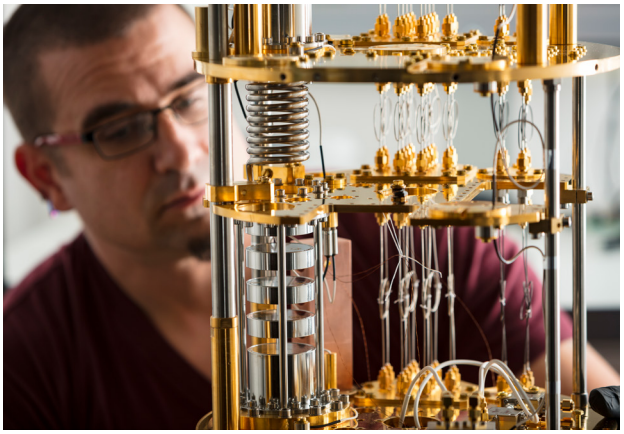
The Combat Systems Evaluation Laboratory supports developers who prototype, test, and field solutions for combat identification, area air defense, time-sensitive targeting, and surface surveillance. The Minotaur Laboratory adds to this capability by enabling engineers to participate in fleet exercises and operations and to perform remote diagnostics of shipboard systems. For more information, contact Don Henderson (don.henderson@jhuapl.edu).

MATERIALS CHARACTERIZATION FACILITY

The Materials Characterization Facility combines expert staff and extensive analytical instrumentation to solve the most demanding materials problems at micro and macro scales using standard and custom-designed, program-specific configurations. All material types are supported (e.g., metals, ceramics, polymers, composites, biomaterials), as are system and subsystem proof and validation testing. For more information, contact Bruce Trethewey (bruce.trethewey@jhuapl.edu).







ALAN BRANDT HYDRODYNAMICS RESEARCH LABORATORY

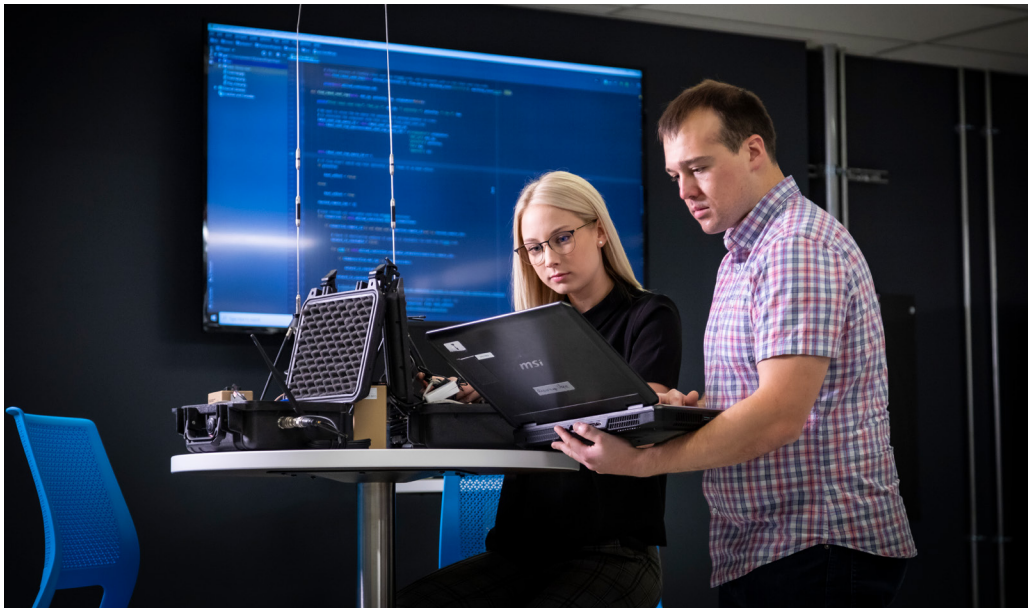
The Alan Brandt Hydrodynamics Research Laboratory was established decades ago to help the Navy and other government sponsors understand the phenomenology behind hydrodynamics challenges—a critical mission that continues today. For more information, contact Scott Wunsch (scott.wunsch@jhuapl.edu).

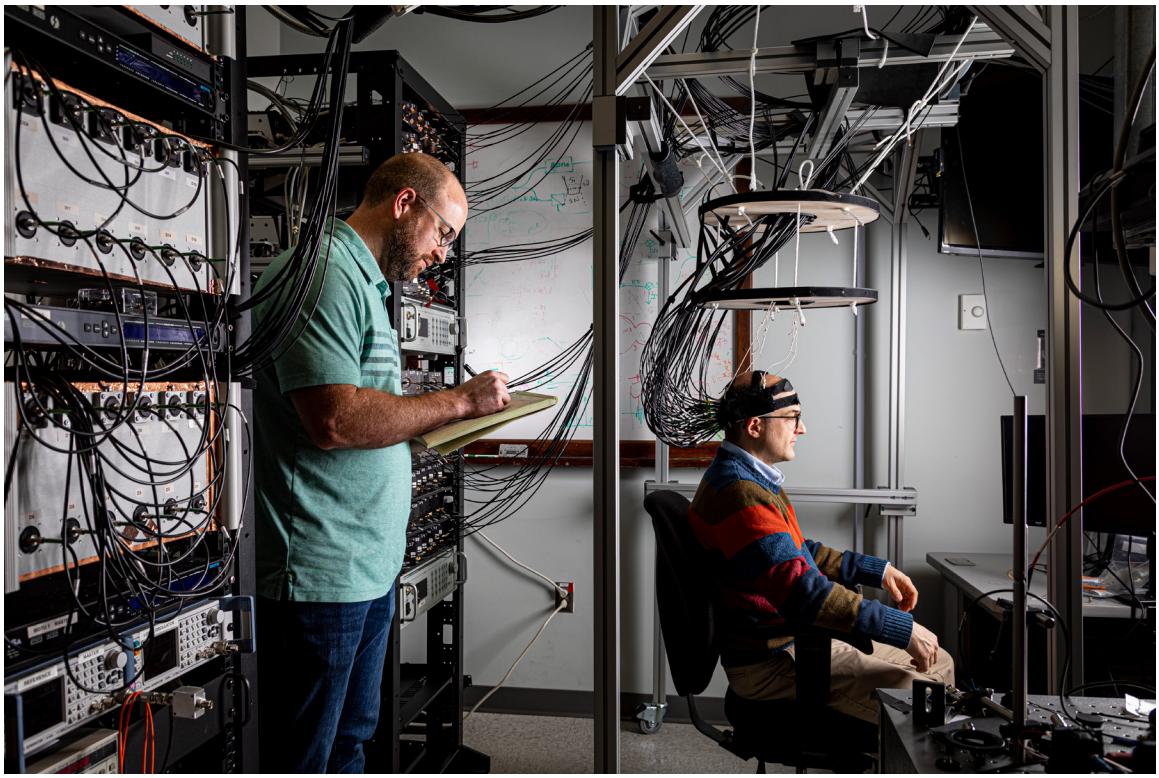
QUANTUM DEVICES LABORATORY

The Quantum Devices Laboratory is a key resource for addressing critical challenges in quantum information science. State-of-the-art cryogenic and quantum control technologies enable researchers to characterize novel quantum devices and validate quantum control techniques with impact to quantum sensing and critical to quantum computing. For more information, contact Timothy Sweeney (timothy.sweeney@jhuapl.edu).

COMMS CENTRAL WIRELESS COMMS LAB

The Comms Central facilities provide a platform for exploration, demonstration, and innovation of diverse communications systems for missions of critical national importance. The Wireless Comms Lab (WCL) is a collaborative space enabling the development of innovative solutions for controlling the wireless communications environment. The lab leverages broad expertise in modeling and simulation, rapid prototyping, end-to-end network analysis, and wireless exploitation to advance the state of the art in electromagnetic maneuverability, network intelligence, and wireless protocol security. The WCL provides specialized facilities and radio frequency (RF) test equipment, including two large RF shield rooms, a demonstration area, and a special projects area for segregating sensitive work from other projects. For more information, contact Amy Howard (amy.howard@jhuapl.edu).





BRAIN–COMPUTER INTERFACE LAB

The Laboratory has developed a significant brain–computer interface (BCI) research program as part of its groundbreaking work leading the Defense Advanced Research Projects Agency Revolutionizing Prosthetics program. Building on research undertaken in creating the world's first neurally controlled prosthetic limb, APL has brought together experts in multiple fields to envision and create world-class, noninvasive, optical imaging BCI technologies. APL and Johns Hopkins Medicine researchers are now working to demonstrate the capabilities of these novel BCI technologies while identifying new applications for sponsors. For more information, contact Dave Blodgett (dave.blodgett@jhuapl.edu) or Scott Hendrickson (scott.hendrickson@jhuapl.edu).