



NAVAL
POSTGRADUATE
SCHOOL

WHERE **SCIENCE**
MEETS THE ART
OF **WARFARE**

ANNUAL REPORT

AND MISSION MEASURES



20
22

DELIVERING
DECISIVE ADVANTAGE

2022

ANNUAL REPORT &
MISSION MEASURES



APPLIED | CLASSIFIED | INNOVATIVE |

MISSION

Provide defense-focused graduate education, including classified studies and interdisciplinary research, to advance the operational effectiveness, technological leadership and warfighting advantage of the Naval service.



For Decisive Advantage



INTERDISCIPLINARY | RESPONSIVE | SECURE

A Message from the President

By Ann E. Rondeau, Vice Admiral, USN (Ret.)



For all of us at the Naval Postgraduate School, 2022 was a year of moving forward.

Together, we focused our core education, aligned our defense-relevant research, and strengthened our institution. We embraced the Navy's "Get Real, Get Better" efforts and incorporated them into our ongoing "NPS Next" transformation.

Looking back, what most stands out to me about 2022 is the great teamwork and dedication across NPS that enabled outstanding progress on our vision and transformation. This work, in parallel with our campus modernization efforts, is revitalizing our institution as a state-of-the-art, highly-adaptable, responsive, and solution-driven leader of graduate education for U.S. seapower and national defense.

In **education**, we worked hard to focus our curricula into core program areas aligned to higher guidance to better meet the unique needs of the Department of the Navy, all while expanding our reach through greater access, hybrid courses, and stackable certificates.

In **research**, we expanded our portfolio and partnerships to include more applied and interdisciplinary projects, experimentation and research groups, all while restructuring to be more responsive to Fleet warfighting requirements.

In **innovation**, we set the stage for our envisioned future, responding to the Secretary of the Navy's call for a Naval Innovation Center at NPS by establishing the Office of Research and Innovation, investing in our facilities, and expanding our strategic collaborations with industry to leverage more emerging technologies.

Underpinning these efforts is how we transformed our **institution**. We implemented a flatter, more agile organizational design. We sharpened our requirements-based financial planning and execution governance. Our expert staff improved key business processes, IT realignment, and support of all campus operations and services.

These vital efforts in core areas were captured and codified in our new NPS Strategic Framework. This framework provides a vision and desired outcomes while transitioning from "NPS Next" lines-of-effort to portfolios of plans aligned to four enduring strategic priorities.

EDUCATION

Extend reach and increase the focus of defense-unique and naval-relevant education

RESEARCH

Increase the impact of applied research that is fully informed and directly contributes to warfighting solutions

INNOVATION

Lead naval innovation via a collaborative ecosystem connecting warrior-scholars with academia and industry

INSTITUTION

Enabled by a learning organization with a shared mission-focused culture developing defense leaders in modern and technologically relevant facilities.

Going forward, 2023 promises to be another pivotal year. With a focus on execution, we will enhance learning beyond academic principles to strengthen education, research, and innovation outcomes.

Our nation is in long-term strategic competition, and our maritime dominance is at risk. NPS must play an increasing role in **accelerating innovation** while delivering **cognitive readiness** and **intellectual leadership** in the art and science of warfare.

Simply put: when all is equal in competition or combat, the human element is the decisive difference. Our students at NPS are the priority — they are our mission.

In abiding service,

Ann E. Rondeau



A Message from the Provost

By Dr. Scott Gartner



The last year at Naval Postgraduate School has been truly transformative. I want to highlight some of the changes, and briefly address how these efforts support the vision of a more relevant, agile and impactful NPS.

Perhaps the most visible change has been a reorganization from four traditional schools to our “One University” model. This change flattens our hierarchy, elevates department Chairs to more prominent leadership roles, and creates new Vice Provost positions to lead the academic transformation, while cutting Provost Office staff considerably. These include the Vice Provost for Academic Affairs, Vice Provost for Research, and Vice Provost for Academic Leadership.

Together, this team is currently consolidating over 100 graduate curricula by more than half, and then further merging those curricula into 9 core NPS Program Areas (see graphic). This consolidation initiative helps NPS to reduce duplication, promote relevant interdisciplinary instruction, and more effectively support warfighter development.

Simultaneously, NPS is setting the stage to extend our educational efforts, by revitalizing distance and hybrid-learning, creating instructional nodes where the Fleet operates, offering more short courses, and shifting to stackable certificates (the ability to combine several certificates into a master’s degree).

Complementing the academic transformation are changes to how we approach research and innovation in support of the academic mission and warfighting development.

CORE PROGRAM AREAS



The newly designated Vice Provost for Research now leads the renamed Office of Research and Innovation (OR&I), supporting both fundamental academic research to ensure faculty and curricula stay cutting-edge, while developing major research proposals aligned to Naval priorities. Working jointly with the Naval Warfare Studies Institute, OR&I is engaging actively with the Fleet and industry shaping applied research and experimentation to drive innovative solutions and rapid prototyping.

We are growing our capacity and capability to leverage our inherent attributes as a hub for defense innovation in a region that is the epicenter of technical innovation in the world. Our ongoing campus modernization efforts are focused on enabling this potential. Innovation driven, NPS develops warfighters and warfighting solutions.

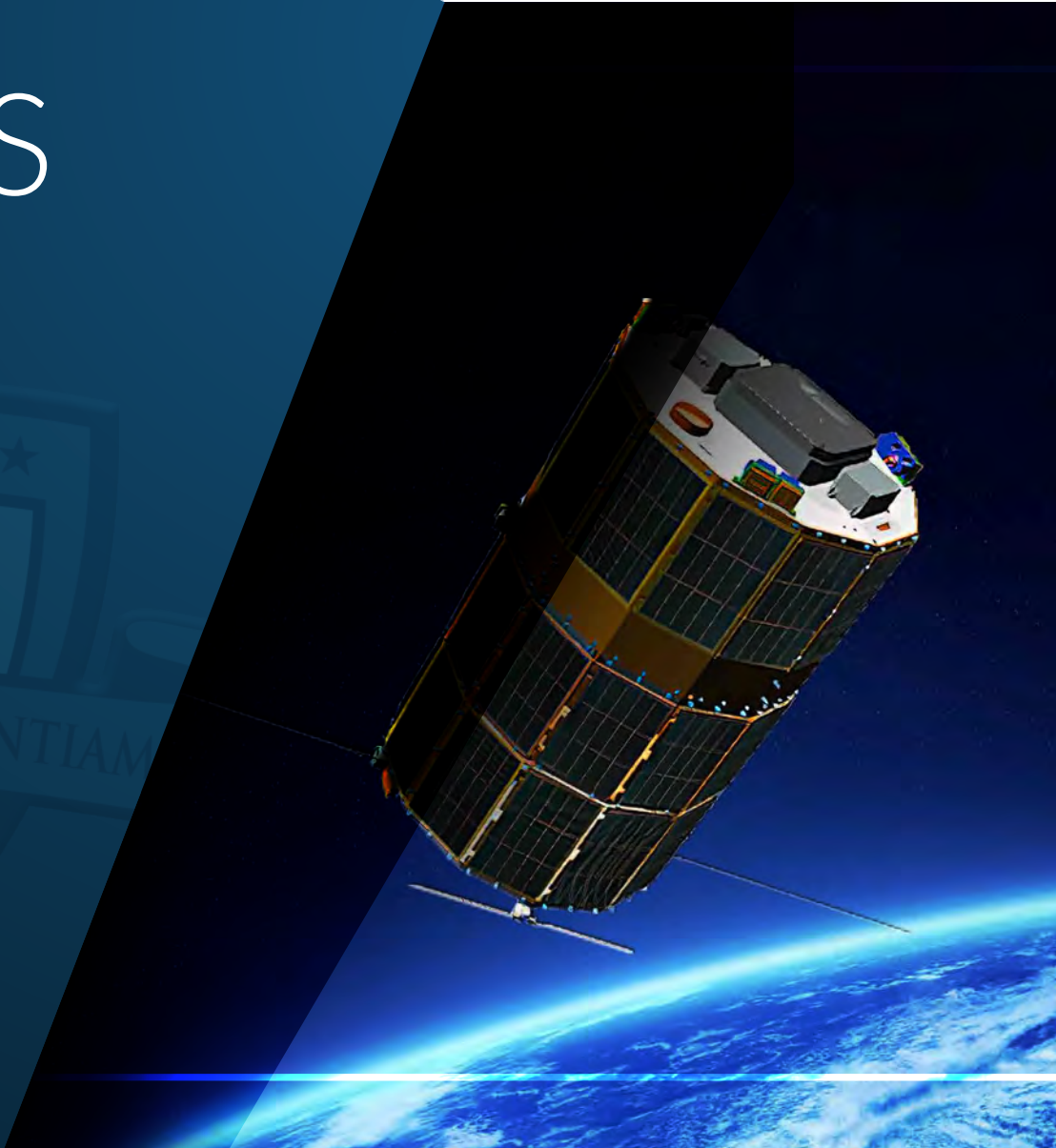
The convergence of strategic competition in the Pacific necessitates a greater contribution from NPS to help our Naval forces maintain maritime advantage through intellectual and technological leadership.

The entire academic leadership team and I are focused on increasing our impact by strengthening the alignment and relevance of NPS education, research, and innovation — one team, one fight!

Scott Gartner

Dr. Scott Gartner

IMPACTS



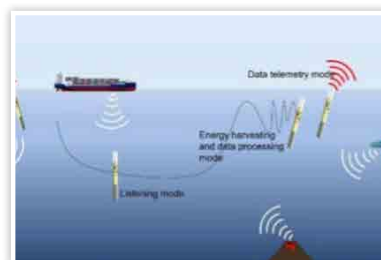
IMPACTS

Example Fleet and Force Outcomes

Applied Education, Research and Innovation

Space: The “Cloud-Enhanced Network and Intelligent Edge” project under the **NPS-Microsoft** CRADA established a successful connection between the Azure Stack Edge and the NPS Mobile CubeSat Communications and Control (MC3) ground station network run by the Space Systems Academic Group. Data and telemetry from the Mola spacecraft, scheduled to launch no earlier than June 2023, will be downlinked into the Cloud environment. **IMPACT:** This capability enhances edge computing solutions and AI/ML research for space applications.

Undersea: NPS and **SEATREC Inc.** are developing an autonomous, sustainably-powered and hydrophone-equipped float system to study the impact of human-made noise on the environment and ambient ocean soundscape. **IMPACT:** Sponsored by the Office of Naval Research through the Consortium for Robotics and Unmanned Systems Education and Research (CRUSER) at NPS, the technology will enable persistent acoustic data collection from anywhere in the world’s oceans for an indefinite period of time.



Enlisted GRAD-ED: MARADMIN 007/23 announced the first CMC Marine Corps Graduate Education Program – Enlisted (MCGEP-E) Pilot at NPS. Gunnery Sgt. Brandon Smart, while a student at NPS, briefed a visiting congressional staff delegation about his NPS research in talent management. **IMPACT:** Smart’s work became the foundation for the “Strengthening the Force and Fleet Through Enlisted Education Act,” submitted by the House Armed Services Committee. This act, **referred to as the “Smart Act” in honor of its originator**, was signed into law by President Biden as part of the Fiscal Year 2023 National Defense Authorization Act and expands opportunities for enlisted warrior-scholars at NPS.

Innovation: 159 participants from industry, DOD, and coalition partners joined NPS students to observe and evaluate industry emerging technologies for Intelligent Autonomous Systems. The quarterly Joint Interagency Field Experimentation (JIFX) was held in November and included Raven Works, whose software makes drones invisible to counter-UAS systems. **IMPACT:** NSWC N85 invited Raven Works to attend SOCOM TE 23-2 and provided information on these capabilities to NSWC N87 UxS Office and SOCOM Counter-UxS Program for their review. JIFX 23-2 in February will focus on Human Performance Monitoring and Situational Awareness.



Intelligence: Classified research analyzed smart technology advancements and trends in East Asia, identifying impacts to the DOD’s ability to plan and conduct operational activities in the region. In a technology-driven operational environment, this thesis research by Lt. Julian Salmon assessed DOD’s ability to maintain the adaptability necessary to meet future operational requirements. Lt. Salmon is an Information Warfare officer who graduated in December 2022 from NPS’ Regional Security Studies program focused on the East Asia and Indo-Pacific region. He was awarded the Naval Intelligence Foundation’s Admiral Bobby Ray Inman Award for Excellence in Intelligence research.

Artificial Intelligence: More than 150 participants from the eight Navy AI Task Forces, Warfare and Warfighting Development Centers, the fleet and FMF and DOD engaged at the **fourth AI Summit** co-hosted by NPS with the Navy’s Chief AI Officer/NIF AI Lead. **IMPACT:** The event included unclassified, CUI and secret presentations in four workshops that addressed: 1) workforce development strategy, 2) AI/ML pipeline for solution development and implementation, 3) a concept for dynamically balanced centralized and edge AI, and 4) a blueprint for a Naval AI organization and governance structure.

Aviation: Ensign Kyler Ward, a recent graduate of the **Shoemaker Scholar program**, a one-year accelerated master’s in aerospace engineering for high-performing USNA and NROTC graduates awaiting flight training, developed an innovative modeling tool that predicts the operation of a fuel injector in a Rotating Detonation Engine. The model determines ideal operation under changing conditions, such as new fuels, engine dimensions, and flight conditions. **IMPACT:** The model has wide applicability, reduces design time significantly, and determines the sensitivity of the delivered performance to certain physical dimensions and characteristics allowing the engineer to concentrate on final performance-driven design and testing.



EXTENDING OUR



**THAT CULTURE OF LIFELONG LEARNING
IS INDEED OUR GREATEST COMPETITIVE
ADVANTAGE.”**

*The Honorable Carlos Del Toro
Secretary of the Navy*



REACH

The Naval Postgraduate School's year of transformation throughout 2022 led to the recognition of four enduring pillars that would serve as driving forces behind the institution's strategic evolution... extending our reach, increasing our impact, leading naval innovation, and strengthening the institution.

The vision for the future of NPS, with respect to extending our reach, is to become the nation's leading institution of defense-unique and naval-relevant higher education and applied research, developing advanced, decisive American seapower for improved national security.

The role of graduate education in advancing all-domain naval power has been a focal point of Secretary of the Navy Carlos Del Toro throughout 2022. During a guest lecture on the NPS campus in August, Del Toro defined an imperative to create a "culture of lifelong learning" within the Department of the Navy that would be our nation's "greatest comparative advantage" over our adversaries.

"We cannot afford to be complacent or assume that we will always have a technological edge on our adversaries," Del Toro said. "Our commitment to lifelong learning is how we stay ahead of the curve."

Del Toro not only emphasized the importance of education in service culture, he defined the students' roles in extending the reach of NPS naval-focused graduate education, and the impact they can have on the future of American seapower.

"Every time you demonstrate how your advanced degree better equipped you to accomplish your mission, you advance our culture," he said. "Every time you lead, you create the culture we need. You control whether our people remain a competitive advantage. You control whether our maritime dominance will continue into the next decade and beyond." ■

TAKE A DEEPER DIVE



NPS Faculty Experience the Fleet in Action Aboard USS Abraham Lincoln



Fellowship Connects NPS Information Warfare Students to NIWC Pacific Needs



NPS, Partners Develop Executive Course on AI/ML Foundations for Senior Leaders



NPS Joins USCYBERCOM Academic Engagement Network



NPS Researchers Leave a Lasting Legacy in Climate Analysis and Prediction



INCREASING OUR I



TOGETHER, WE WILL BUILD CRITICAL ADVANTAGES OVER OUR COMPETITORS TO MAXIMIZE OUR STRENGTHS.”

*Adm. Samuel Paparo
Commander, U.S. Pacific Fleet*



IMPACT

The Chief of Naval Operations' NAVPLAN 2022 established six Force Design imperatives to build the future naval force, deliver deterrence at sea, and if necessary, employ future warfighting concepts so the United States maintains global primacy among maritime nations.

Across all six of these imperatives — defined as distance, deception, defense, distribution, delivery and decision advantage — lies a foundational need for impactful research and discovery among a portfolio of emerging technologies. The Naval Postgraduate School, in turn, must ensure the impact of the university's applied research is fully informed by, and directly contributes to, naval warfighting solutions.

Delivering on this promise necessitated new ways of operating at the university, marrying the research endeavors of some 1,500 graduate students and their faculty advisors directly to the needs of the Fleet. The establishment of the Nimitz Research Group in February 2022, in partnership with U.S. Pacific Fleet, has provided a powerful step forward.

"The Nimitz Research Group links the intellectual rigor of NPS, its key location in the nation's hub of technical innovation and the expertise of innovative warfighters in the Pacific Fleet to research, develop and implement new and dynamic combat capabilities," said Adm. Samuel J. Paparo, Commander, U.S. Pacific Fleet.

"Together, we will build critical advantages over our competitors to maximize our strengths — battlespace awareness, agility, maneuverability and collective capabilities of the joint forces," he continued.

Under the direction of NPS' Naval Warfare Studies Institute, similar efforts, such as the Bucklew Research Group in support of Naval Special Warfare, have provided a blueprint to drive coherence and unity from the efforts of many ... And in turn, position the university to deliver on its promise. ■

TAKE A DEEPER DIVE



From Idea to Impact — NPS Grad Delivers on Autonomous, Predictive Maintenance for USMC



Students Explore Use of Persistent Augmented Reality to Advance Decision Cycle



Naval Postgraduate School Collaborates With Microsoft to Bring Emerging Technologies to the Fleet



NPS, U.S. Pacific Fleet Launch Nimitz Research Group



NPS Researchers Unravel the Stability Mystery of Ocean Rings



LEADING NAVAL INNOVATION



AMERICAN POWER, INNOVATION, AND VALUES MAKE THE U.S. MILITARY THE STRONGEST FIGHTING FORCE IN HUMAN HISTORY.”

*The Honorable Lloyd J. Austin
U.S. Secretary of Defense*



INNOVATION

The critical role of innovation in national defense and naval power is undeniable. Time and again, national security strategies and senior U.S. leaders reiterate this fundamental, and widely accepted, reality.

The Naval Postgraduate School has embraced the institution's role and responsibility in leading naval innovation as a core function of the institution by fully leveraging the university's enduring fundamental characteristics... experienced warrior-scholar students with a passion for advancing the naval service; renowned expert faculty across the STEM disciplines; and, a location near the heart of American technological innovation.

"The imperative in today's strategic competition is to leverage innovation and invest more deeply in our warrior-scholar future to thrive in the inevitable chaos of war," wrote retired Vice Adm. Ann E. Rondeau, NPS President, in an August 2022 article in the U.S. Naval Institute's Proceedings. Rondeau defined the university's strategic commitment to advance decision advantage through innovation and intellectual overmatch, locked in alignment with the CNO's Force Design Imperatives and in partnership across the Naval Education Ecosystem (NEE).

And it is through the NEE, expanded to include academic and industry partners, that Secretary of the Navy Carlos Del Toro sees the future potential of NPS as a leader of naval innovation.

"I am also directing the creation of a Navy Innovation Center at the Naval Postgraduate School in Monterey, California — right in the heart of our nation's leading technology corridor," Del Toro said during a presentation at Columbia University in late 2022.

Del Toro continued, stating this Naval Innovation Center would "serve as a premier military education facility tailored to innovation and experimentation, serving as a technology resource for Navy and Marine Corps warfighting development commands, as well as a go-to partner of the defense industrial base, the technology sector, and academia." ■

TAKE A DEEPER DIVE



NPS Office of Research and Innovation will Accelerate Solutions from Idea to Impact



NPS Joins Forces with Stanford Doerr School of Sustainability to Address Sustainability, Climate and Energy Challenges



Naval Warfare Innovation Continuum Workshop at NPS Focuses on Technologies for Hybrid Force Operations



USS Essex First Ship to Participate in Naval Postgraduate School 3D Printer Research



STRENGTHENING THE INS



TEAMWORK AND DEDICATION ACROSS NPS ENABLED ANOTHER YEAR OF OUTSTANDING PROGRESS AND TRANSFORMATION ... DEVELOPING NPS INTO A LEADING 21ST CENTURY EDUCATION INSTITUTION."

*Vice Adm. Ann E. Rondeau, USN (ret.)
President, Naval Postgraduate School*



TITUTION



As the Naval Postgraduate School continued on its path of transformation through comprehensive, campus-wide NPS Next initiatives, the vision for the future of NPS, and the pathways to achieve it, became clearer and more critical than ever.

Changes to the university's organizational structure have led to an institution that is more integrated, more effectively interdisciplinary, and empowered to advance defense education and research at the pace of technological change. Catalyzed by the Navy's fleet-wide "Get Real, Get Better" initiative, the university has streamlined several core business areas to advance productivity while simultaneously increasing transparency.

In addition, previous institutional changes initiated through NPS Next in 2021 have bore fruit in 2022. The maturation of the Naval Warfare Studies Institute (NWSI) is helping guide campus-wide research partnerships with industry partners like Microsoft, Xerox and many others. And with the recent establishment of the NPS Office of Research and Innovation, NPS is strengthening the university's role in the Naval Research & Development Enterprise, and into the broader Fleet and combatant commands, positioning the school to more effectively contribute to larger research efforts that accelerate solutions to key operational problems from concept to capability.

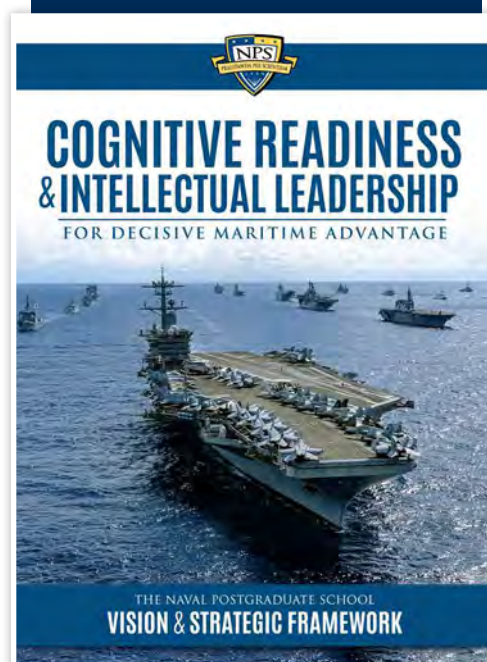
The physical campus has defined a much-needed modernization effort to the original academic quad built in the 1950s. Through the diligent efforts of NPS' staff, faculty and leadership, the university's Bullard Hall, home of NPS' Space Systems and Systems Engineering programs, launched a complete modernization overhaul in 2022 that will comprehensively revitalize the facility's support to the NPS academic and research mission.

The result of all of these efforts is an enabling organization with a shared mission-focused culture that develops

TAKE A DEEPER DIVE



Strategic Framework for
Decisive Maritime Advantage



defense leaders. In addition, a realized NPS Vision and Strategic Framework, developed over 2022 for release at the beginning of the following year, charts a course forward with mission-driven initiatives in step with Fleet-driven strategic outcomes. ■

2022 YEAR-IN-REVIEW

JAN

An NPS student's award-winning thesis helps Naval Station Newport prepare for a hurricane

NPS Climate and Security Network leaders join the world's largest international climate conference in Glasgow

Computer Science releases its **Harnessing Artificial Intelligence 2.0** course and video series (Dr. Britta Hale, Department of Computer Science, pictured)



FEB

USCYBERCOM selects NPS to join its Academic Engagement Network

Commander, U.S. Pacific Fleet (PACFLT) and NPS establish the Nimitz Research Group to leverage resources

Information Technology and Communications Services receives the prestigious **DON IT Excellence "Defend" Award**



MAR

Researchers finalize a cutting-edge interdisciplinary study on the convergence of electronic and cyber warfare

Defense Analysis students host a lecture by **Dr. Roger Myerson, internationally-acclaimed economist, game theorist** and Nobel Memorial Prize recipient in Economic Sciences

NPS receives funding to research the potential for using ultra-high temperature ceramics for particulate resilience in aircraft turbines



U.S. Marine Corps Lt. Gen. Matthew Glavy, Deputy Commandant for Information, is the commencement speaker for the 248 NPS graduates, including 28 international students from 15 countries





APR

A provisional patent for liquid air energy storage and recovery is issued to an NPS professor and his students

NPS receives a major grant to explore a groundbreaking new way to model hurricanes and other extreme weather events. Dr. Frank Giraldo (pictured), Distinguished Professor and Chair of the Applied Mathematics department, leads the machine learning aspects of the project



Faculty from NPS mentor local high school students in crafting a robot for the local **For Inspiration and Recognition of Science and Technology (FIRST) Robotics Competition**

Researchers evaluate the cost benefits of battery-powered warships as part of the DOD "Pathways to Net Zero Emissions by 2050" program

MAY

Microsoft partners with NPS to deliver to the Fleet emerging technologies in gaming, exercising, modeling and simulation

Cryptography experts from NPS and Norway's National Security Authority collaborate to develop improved cyber security and secure communications systems

The campus welcomes the public to NPS **Discovery Day** and International Day



Vice Chief of Naval Operations Adm. William Lescher speaks to the campus about the Navy's "Get Real, Get Better" initiative and this era of strategic competition

JUN

Researchers in Oceanography crack the code on the mystery of the differing lifespan of ocean rings

Interdisciplinary research is the main focus of the 19th annual NPS Acquisition Research Symposium

U.S. Space Force Gen. John W. "Jay" Raymond, Chief of Space Operations, serves as the keynote speaker for 343 graduates, including 3 Guardians and 18 international students from 11 countries.



Microsoft Executive Vice President of Strategic Missions and Technologies discusses cyberspace and the fifth domain in strategic competition in a special guest lecture

NPS hosts panel discussion on "The Need for U.S. Seapower in a Challenging World" with USNI leaders

2022 YEAR-IN-REVIEW

JUL

NPS advances climate analysis and prediction through researching regional indicators in precursor conditions in the ocean and atmosphere

Commander, Naval Surface Force, U.S. Pacific Fleet (COMNAVSURFPAC) oversees the installation, initial testing and evaluation of an NPS **3D printer** on the Wasp-class amphibious assault ship **USS Essex**

An assistant professor in Defense Analysis is awarded the Society for the History of American Foreign Relations' Oxford University Press USA Dissertation Prize in International History



AUG

SECNAV and NPS alumnus Carlos Del Toro emphasizes lifelong learning as a “strategic imperative” in an address to the campus

Athena, the innovative real-time tool for accessing NPS research, is launched in beta for collaborators throughout the Naval Research and Development Establishment

The ONR STEM Coordination Office partners with NPS to host a cohort of high school summer interns interested in defense-focused research



SEP

Stanford University partners with NPS and the Defense Innovation Unit in hosting a course for senior defense leaders on the emerging roles of Artificial Intelligence and Machine Learning in the military

Eight NPS faculty observed flight deck operations and daily operations on the Nimitz-class aircraft carrier **USS Abraham Lincoln (CVN 72)**, one of the largest warfighting platforms in the world

The Honorable **Robert O. Work**, NPS alumnus, inducted into the NPS Hall of Fame and 32nd Deputy Secretary of Defense, is the guest speaker commencement honoring 270 graduates, including 29 international students from eight countries





OCT

The campus mourns the passing of former **Acquisition Chair Rear Adm. Jim Greene** recognizing his 50 years of naval service, and as an NPS faculty member for 20

An Operations Research student is recognized for his research on submarine force tactics and his thesis, "Revisiting Submarine Wolfpack Tactics Using Computational Methods"

For his theoretical knowledge and improvements in the early warning systems of hurricanes and tropical cyclones, an NPS Distinguished Professor is awarded the Royal Meteorological Society Buchan Prize

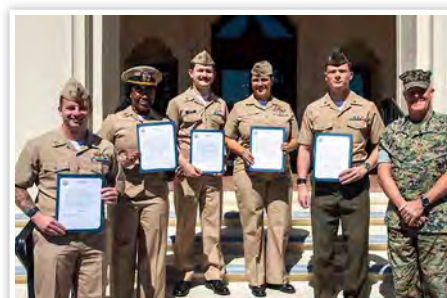


NOV

A Meteorology professor receives an award from the ONR Young Investigator Program for work on ocean wave impacts on the temperature and humidity structures in the lower atmosphere

The campus celebrates with its associate professor in Operations Research, a finalist in the Professors Tournament of Champions on the show "Jeopardy!"

NPS **students awarded the Naval Information Warfare Center Pacific Fellowship** are announced, selected for the direct connection between their upcoming research and fleet information warfare force design objectives



DEC

The Honorable Carlos Del Toro, Secretary of the Navy, serves as commencement speaker for 337 new NPS graduates, including 40 international students representing 24 countries

NPS is welcomed into the University Consortium for Applied Hypersonics, a collaborative network of industry, academia and laboratories serving the DOD in this emerging field

Adm. Cecil Haney, USN (ret.), former Commander, U.S. Strategic Command, is welcomed into the NPS Hall of Fame

NPS signs **Education Partnership Agreement with Stanford Doerr School of Sustainability** to join forces on increasing challenges of global climate change, energy security and sustainability



OUR COMPARAT

WARFIGHTER DEVELOPMENT

Critical and strategic thinkers able to problem-solve, adapt, innovate, and lead



Minimum

Naval Engineering

Combat Systems

Cyber and Information Systems

Data Science and Decisions

Global Security and Strategic Competition

Defense Systems Management

Space Technology and Operations

Maritime Battlespace Environments

Modeling, Simulation, and Visualization



Rapid Prototyping and

The Department of the Navy is driving innovation

"The best way to deter our adversaries is for the department to restore its technological superiority..."
— Secretary of the

IVE ADVANTAGE



Viable Solutions



Field Experimentation

WARFIGHTING DEVELOPMENT

Classified and applied research and innovative solutions

C-C5ISR

Long Range Fires

Terminal Defense

Contested Logistics

Maritime Domain Awareness

Artificial Intelligence

Intelligent Autonomous Systems

Naval Operational Architecture

Modeling & Simulation GEMS/LVC

Climate Action

across every corner of the enterprise.

Education is the key connector for this work. Our educational institutions hold great promise and opportunity."
Navy Carlos Del Toro

MISSION MEASURES

Current Leadership

President: Dr. Ann E. Rondeau, Vice Admiral, USN (Ret.)
Provost: Dr. Scott Gartner
Chief of Staff: Capt. Philip Old, USN
Chief Operating Officer: Rob Sweeney
Command Information Officer: Scott Bischoff
Naval Warfare Studies Institute: Col. Randy Pugh
Vice Provost for Academic Affairs: Dr. Joseph Hooper
Vice Provost for Research: Dr. Kevin Smith
Vice Provost for Academic Leadership: Dr. Jomana Amara
Dean of Students: Capt. Brandon Bryan, USN

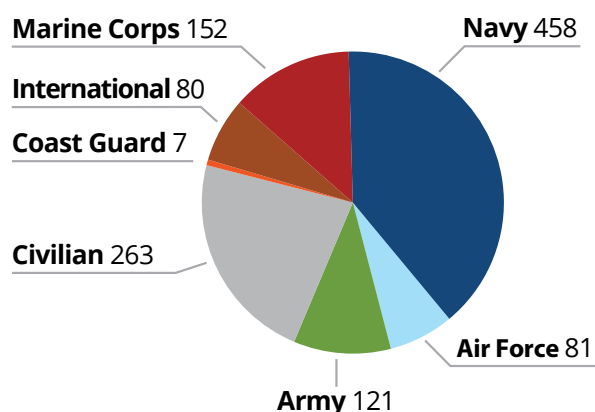
2022 Student Engagement

1,400 Resident Degree
715 Distance Learning Degree
557 Certificate/Non-Degree
10,117 EE/PD*
12,789 total engagement

2022 Degrees Awarded

1,151 Master's Degrees
11 Doctorate (Ph.D.)
1,162 total degrees

NPS Graduate Degrees Conferred by Service



* EE/PD = Executive Education/Professional Development

Faculty & Staff

200 Tenure Track Faculty
Non Tenure Track Faculty:
161 Instructional Faculty
163 Research Faculty
9 Administrative Faculty
304 Staff

Financials

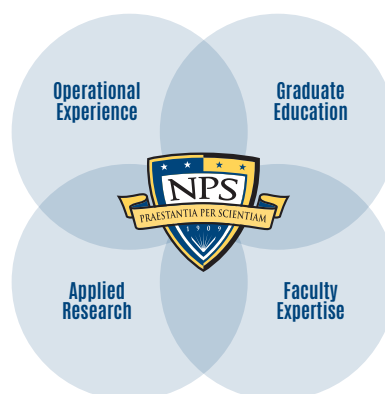
- **\$111** million Direct Authorization (w/o military salary)
- Approx **\$107** million in sponsored/reimbursable education and research programs

Research

- **611** Public Theses and Dissertations
- **213** Faculty Research
- **101** Classified Thesis and Reports
- **22** Technical Reports
- **4** Patents Received
- **28** Patents Submitted in FY22
- **47** Cooperative Research and Development Agreements

Accreditation

- WASC Senior College and University Commission (WSCUC)
- Accreditation Board for Engineering and Technology (ABET)
- Association to Advance Collegiate Schools of Business (AACSB)
- Network of Schools of Public Policy, Affairs, and Administration (NASPAA)



NPS synchronizes student *operational experience* and *graduate education* with *applied research* and *faculty expertise* to deliver warfighting solutions and leaders educated to employ them.

STUDENTS & PROGRAMS



STUDENTS & PROGRAMS

Graduate Program Enrollment

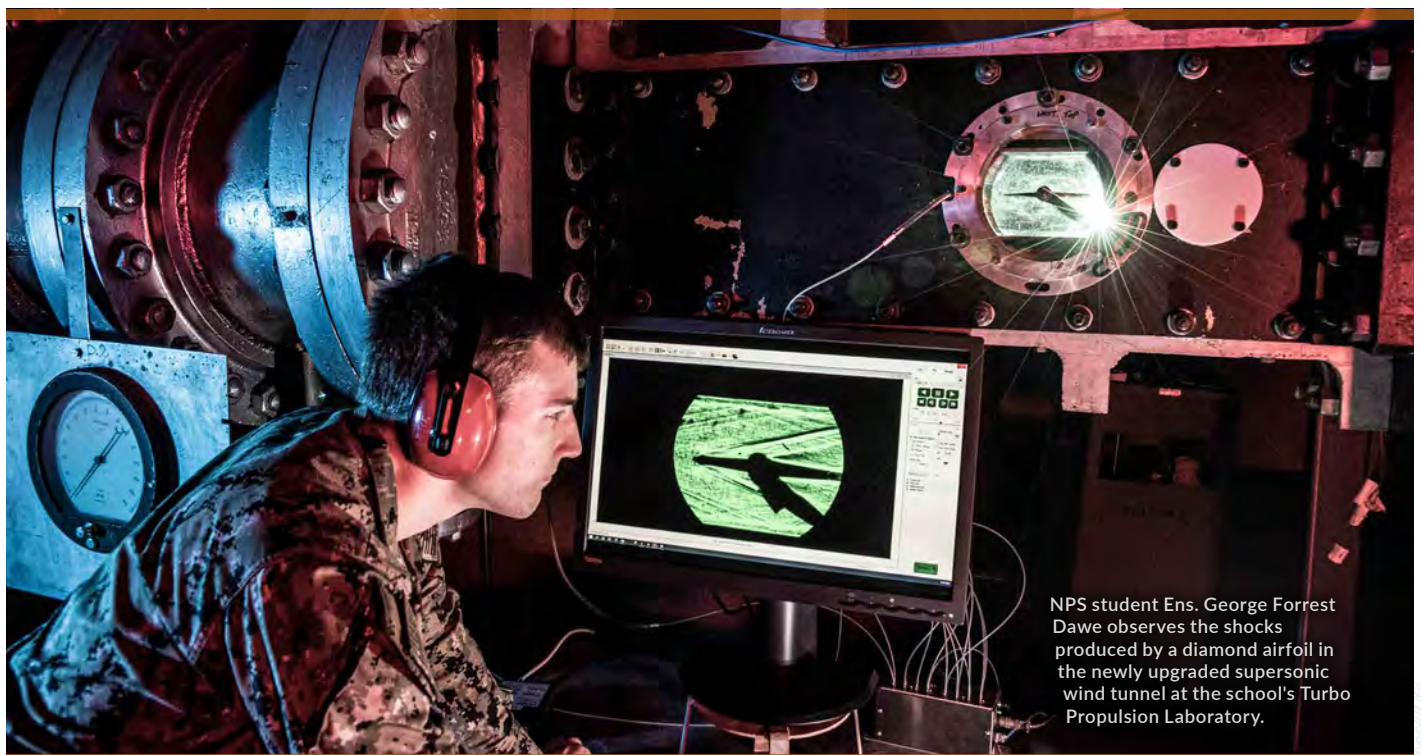
2022

1,400 FULL TIME RESIDENT DEGREE

715 DISTANCE LEARNING (DL) DEGREE

557 GRADUATE CERTIFICATE AND NON-DEGREE

*Numbers may not sum to total due to rounding.



NPS student Ens. George Forrest Dawe observes the shocks produced by a diamond airfoil in the newly upgraded supersonic wind tunnel at the school's Turbo Propulsion Laboratory.



Graduate Student Enrollment

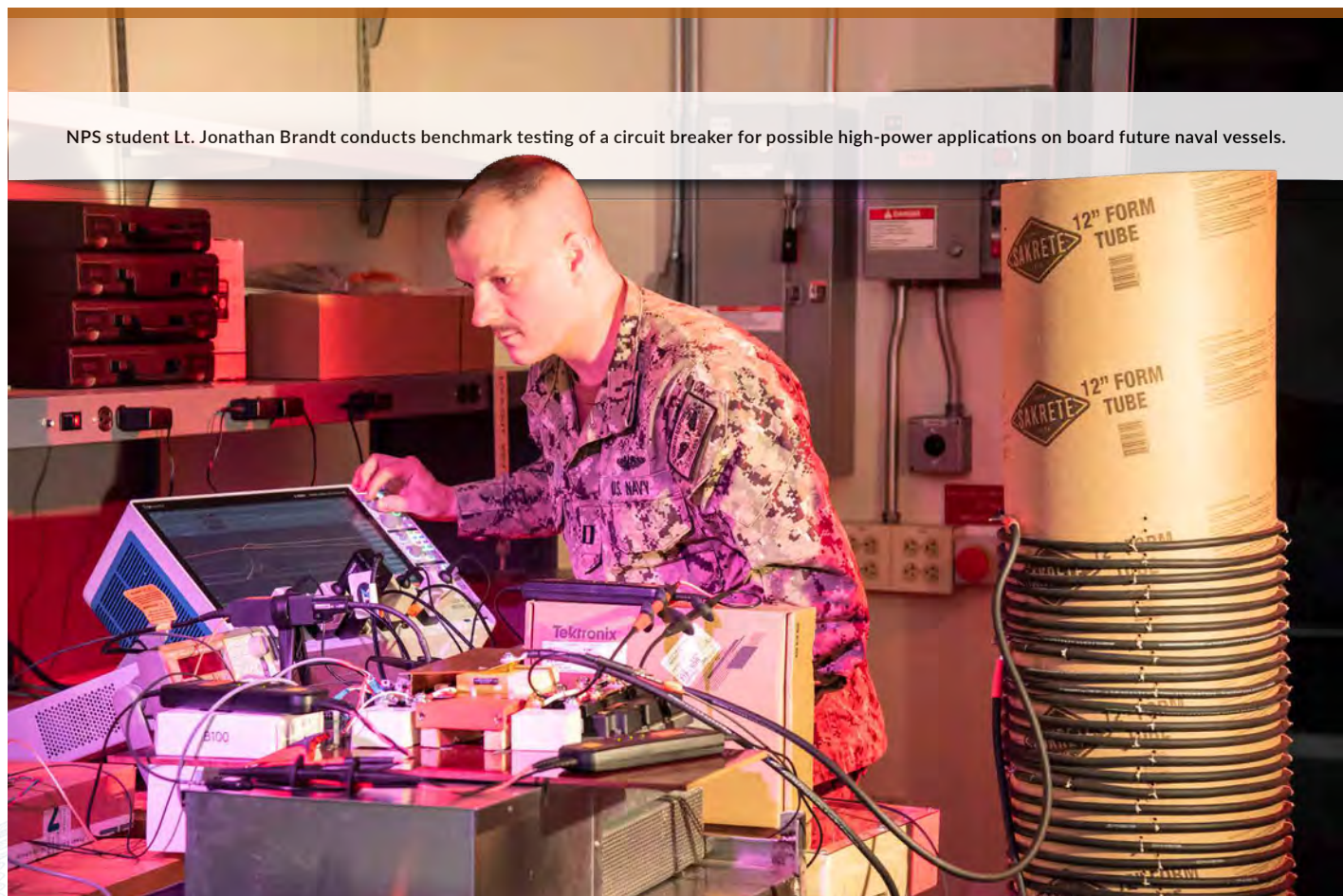
By Service

In 2022, 2,672* students attended the Naval Postgraduate School. NPS is a place where operationally experienced officers from the joint services, civilians from various defense and homeland security organizations, and international students from nearly 50 countries come together to learn from, and work with, a world-class faculty focused on global security issues vital to our national security strategy.

Type of Enrollment By Service	Full-Time Resident Degree	Distance Learning (DL) Degree	Graduate Certificate & Non-Degree
USN/R	591	260	171
USMC/R	232	40	35
USA/R	160	10	21
USAF/R	78	2	32
Other Services	11	1	0
Civilian	173	402	285
International	156	1	12

* Does not include EE/PD

**Numbers may not sum to total due to rounding.



Graduate Student Enrollment

Total U.S. Navy

591 FULL TIME RESIDENT DEGREE

260 DISTANCE LEARNING (DL) DEGREE

171 GRADUATE CERTIFICATE AND NON-DEGREE



NPS student of the Electrical and Computer Engineering department Lt. Matthew Storm runs experiments on a common mode voltage eliminating, grid-forming, voltage source inverter (VSI). The tests allowed him to observe output phase voltages and the Field Effect Transistor (FET) switching waveforms on the oscilloscope screen.



Graduate Student Enrollment

By USN/R Community

In 2022, 1,021 USN/R students attended the Naval Postgraduate School. Student research addresses critical real world requirements relevant to combatant commander and warfighter needs through a unique integration of government agencies, commercial enterprises, other notable research universities and our allies.

Type of Enrollment By USN/R Community	Full-Time Resident Degree	Distance Learning (DL) Degree	Graduate Certificate & Non-Degree
Aviation	20	67	41
Enlisted	14	0	6
Limited Duty	2	5	3
RL	84	41	278
Special Operations and Warfare	2	3	20
Staff Corps	26	52	90
Submarine Warfare	11	40	59
Surface Warfare	11	50	94
Warrant Officer	2	3	0

* Does not include EE/PD. **Numbers may not sum to total due to rounding.

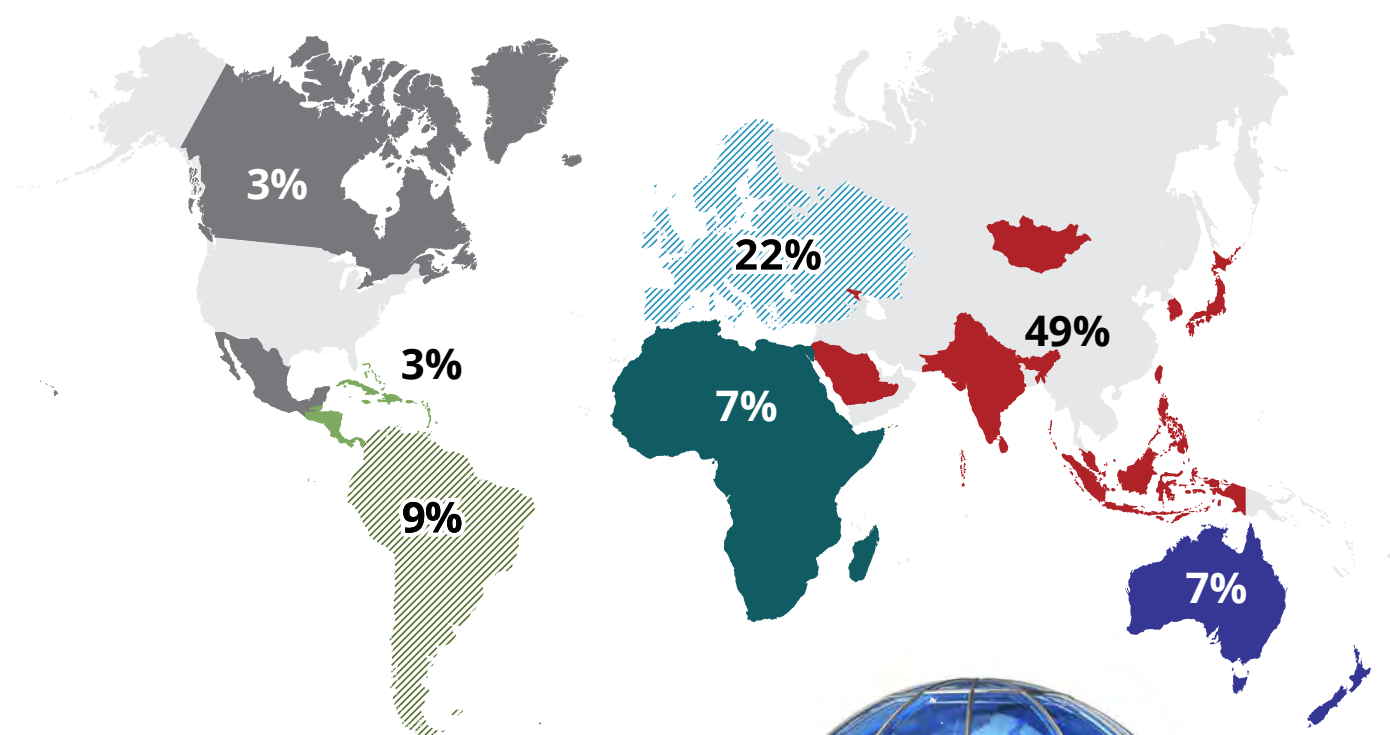
Technicians upgrade the ground station for the Mobile CubeSat Command and Control project on Spanagel Hall on the NPS campus.



International Resident Degree Students

By Region

Asia		Africa		Europe		North America	
Armenia	1	Algeria	3	Belgium	1	Canada	1
Georgia	3	Benin	1	Bulgaria	2	Mexico	4
India	1	Cameroon	1	Denmark	1	Total	5
Indonesia	7	Egypt	1	Estonia	1		
Israel	2	Ghana	3	Finland	1	Oceania	
Japan	1	Malawi	1	Germany	5	Australia	12
Jordan	2	Nigeria	2	Greece	13	Total	12
Maldives	3	Sierra Leone	1	Latvia	1		
Mongolia	5	Uganda	1	Netherlands	3	South America	
Nepal	2	Total	13	Norway	3	Ecuador	1
Pakistan	9	Caribbean & Central America		Romania	1	Colombia	1
Philippines	10	Barbados	1	Sweden	3	Uruguay	1
Saudi Arabia	1	Belize	2	Ukraine	2	Chile	1
Singapore	22	Jamaica	1	Total	37	Brazil	11
South Korea	11	Trinidad and Tobago	1			Peru	1
Sri Lanka	1	Total	5			Total	15
Taiwan	3						
Total	83						



Degree Students	
Africa	13
Asia	83
Caribbean & Central America	5
Europe	37
North America	5
Oceania	12
South America	15
Total	170

Numbers may not total due to rounding. Countries with zero listed had one student at NPS from that country for one quarter of the academic year.



Degrees Conferred

By Degree Type

1,151 MASTER'S DEGREES

11 DOCTOR OF PHILOSOPHY DEGREES (PH.D)



Degrees Conferred

By Academic Unit

CAG – CYBER ACADEMIC GROUP	18
MS Computer Science	7
MS Cyber Systems and Operations	6
MS Engineering Science (Electrical Engineering)	5
CS – COMPUTER SCIENCE	39
MS Computer Science	27
MS Modeling, Virtual Environments and Simulation	10
PhD Computer Science	1
PhD Modeling, Virtual Environments and Simulation	1
DA – DEFENSE ANALYSIS	65
MS Applied Design for Innovation	14
MS Defense Analysis (Irregular Warfare)	38
MS Information Strategy and Political Warfare	13
DDM – DEPARTMENT OF DEFENSE MANAGEMENT	314
EMBA Executive Master of Business Administration	88
MBA Master of Business Administration	122
MS Contract Management	26
MS Management	38
MS Program Management	24
PMBA Leadership Education and Development	13
PMBA Professional Master of Business Administration	3
ECE – ELECTRICAL AND COMPUTER ENGINEERING	54
MEng Electrical Engineering	22
MS Electrical Engineering	30
MS Engineering Science (Electrical Engineering)	1
PhD Electrical Engineering	1
IS – INFORMATION SCIENCES	36
MS Applied Cyber Operations	6
MS Information Technology Management	7
MS Information Warfare Systems Engineering	8
MS Network Operations and Technology	13
MS Systems Technology (Command, Control, and Communications)	1
PhD Information Sciences	1
MA – APPLIED MATHEMATICS	4
MS Applied Mathematics	3
PhD Applied Mathematics	1
MAE – MECHANICAL AND AEROSPACE ENGINEERING	48
ME Mechanical Engineer	1
MS Aerospace Engineering	8
MS Engineering Science (Aerospace Engineering)	9
MS Engineering Science (Mechanical Engineering)	6
MS Mechanical Engineering	23
PhD Mechanical Engineering	1
MR – METEOROLOGY	18
MS Meteorology	2
MS Meteorology and Physical Oceanography	16

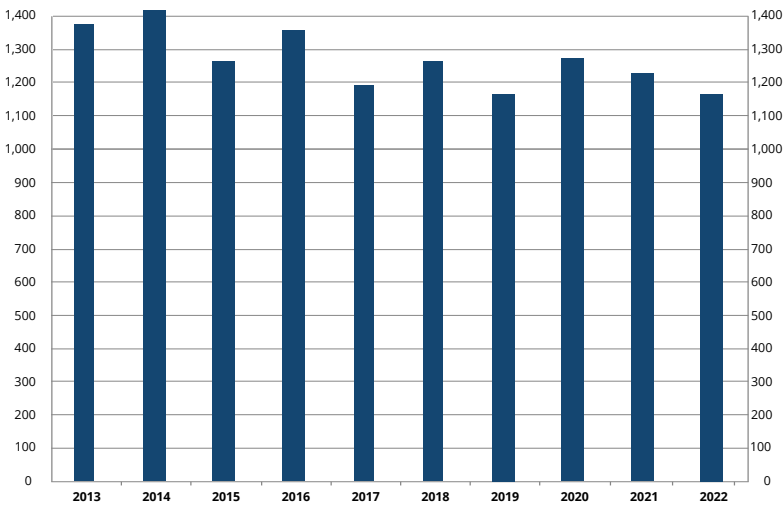


NSA – NATIONAL SECURITY AFFAIRS	193
MA Security Studies (Civil-Military Relations)	2
MA Security Studies (Combating Terrorism: Policy and Strategy)	11
MA Security Studies (East Asia and the Indo-Pacific)	38
MA Security Studies (Europe and Eurasia)	29
MA Security Studies (Homeland Security and Defense)	52
MA Security Studies (Middle East, South Asia, Sub-Saharan Africa)	35
MA Security Studies (Strategic Studies)	9
MA Security Studies (Western Hemisphere)	16
PhD Security Studies	1
OR – OPERATIONS RESEARCH	96
MS Cost Estimating and Analysis	24
MS Human Systems Integration	6
MS Systems Analysis	17
MS Applied Science (Operations Research)	3
MS Human Systems Integration	1
MS Operations Research	44
PhD Operations Research	1
PH – PHYSICS	20
MS Engineering Acoustics	1
MS Applied Physics	16
MS Physics	2
PhD Engineering Acoustics	1
SE – SYSTEMS ENGINEERING	196
MS Engineering Systems	5
MS Systems Engineering	90
MS Systems Engineering Management	100
PhD Systems Engineering	1
SE/OR – SYSTEMS ENGINEERING/OPERATIONS RESEARCH	9
MS Systems Engineering	3
MS Systems Engineering Analysis	6
SP – SPACE SYSTEMS ACADEMIC GROUP	38
MS Astronautical Engineer	3
MS Astronautical Engineering	18
MS Engineering Science (Astronautical Engineering)	1
MS Space Systems Operations	15
PhD Astronautical Engineering	1
USWAG – UNDERSEA WARFARE ACADEMIC GROUP	14
MS Applied Mathematics	3
MS Electrical Engineering	2
MS Engineering Acoustics	1
MS Mechanical Engineering	1
MS Operations Research	1
MS Physical Oceanography	5
MS Physics	1
NPS TOTAL	1162

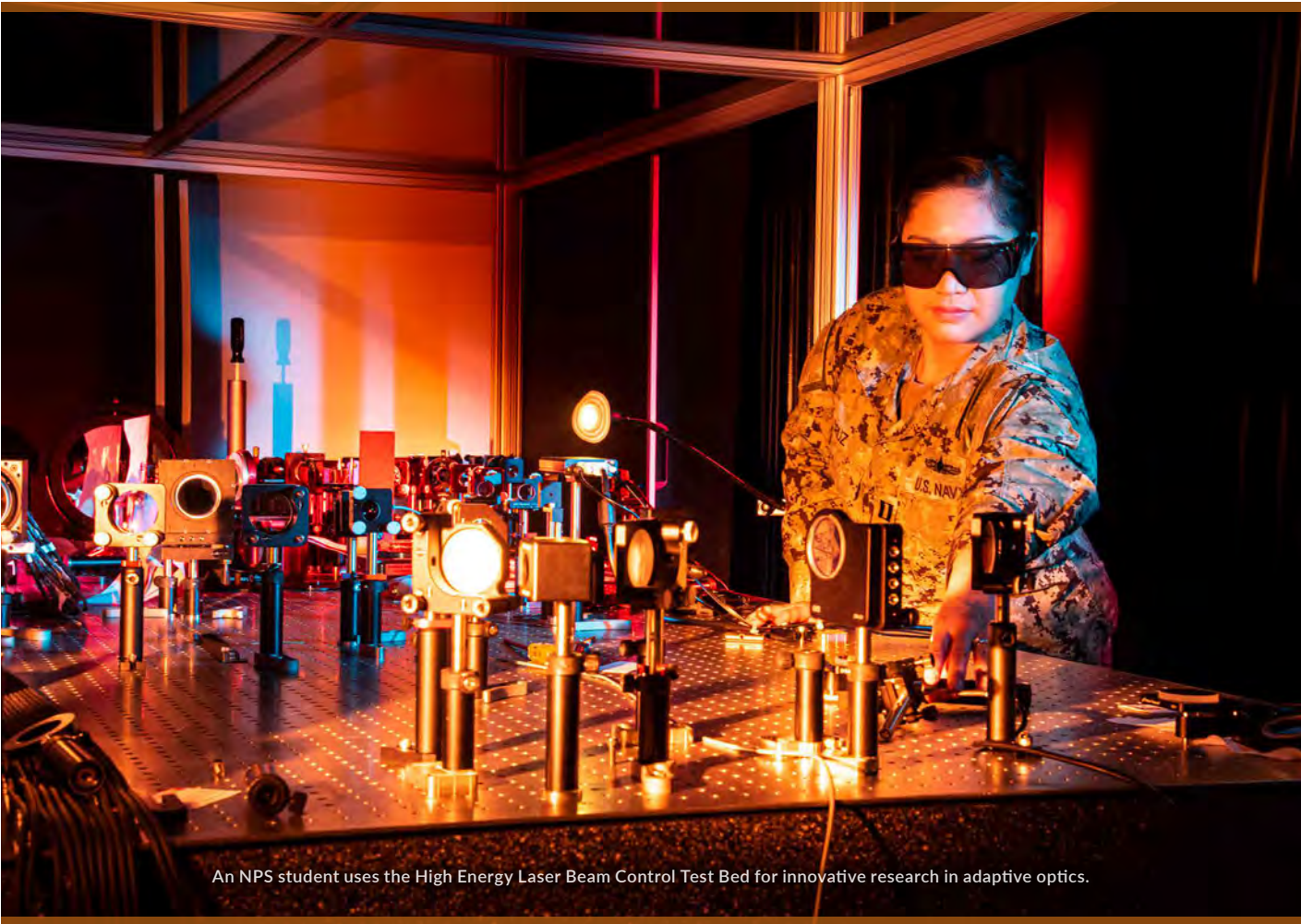


Degrees Conferred *continued*

Degrees Conferred Trend



YEAR	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Degrees	1,373	1,411	1,269	1,358	1,193	1,260	1,161	1,275	1,221	1,162



An NPS student uses the High Energy Laser Beam Control Test Bed for innovative research in adaptive optics.



NPS researchers onboard the R/V Fulmar conduct acoustics experimentation in Monterey Bay.

RESEARCH & INNOVATION



RESEARCH & INNOVATION

Program Overview

The Naval Postgraduate School (NPS) has robust research and innovation programs. Per U.S. Code, Title 10 – 8541, NPS will... “provide advanced instruction and professional and technical education and research opportunities...” Sponsored programs (research, education, and professional development) are integral to the Naval Postgraduate School mission. The research programs support graduate education by providing militarily relevant thesis topics that address issues from the current needs of the Fleet and joint forces to the science and technology required to sustain long-term superiority of the Navy/DOD. Research varies from the fundamental to the applied and covers all levels of classification. Sponsored research includes:

- ▶ Fleet Support
- ▶ Basic and Applied Research
- ▶ Individual and Interdisciplinary Group Projects
- ▶ Cooperative Research and Development Agreements

Sponsored education programs include integrated graduate education and research in space systems, total-ship systems engineering, combat systems, systems engineering and homeland security and defense, supplemented by off-campus graduate and certificate programs. Professional development programs utilize NPS faculty expertise and student experience to support various communities within the Navy and DOD through short courses and web-based services.

Research Portfolio

Research at NPS is intently focused on critical issues within the Departments of the Navy and Defense. Annually, the top 10 focal areas of NPS research are directly aligned to key operational problems detailed by Naval leadership in fleet and force strategies. For more about NPS research, see: nps.edu/research.

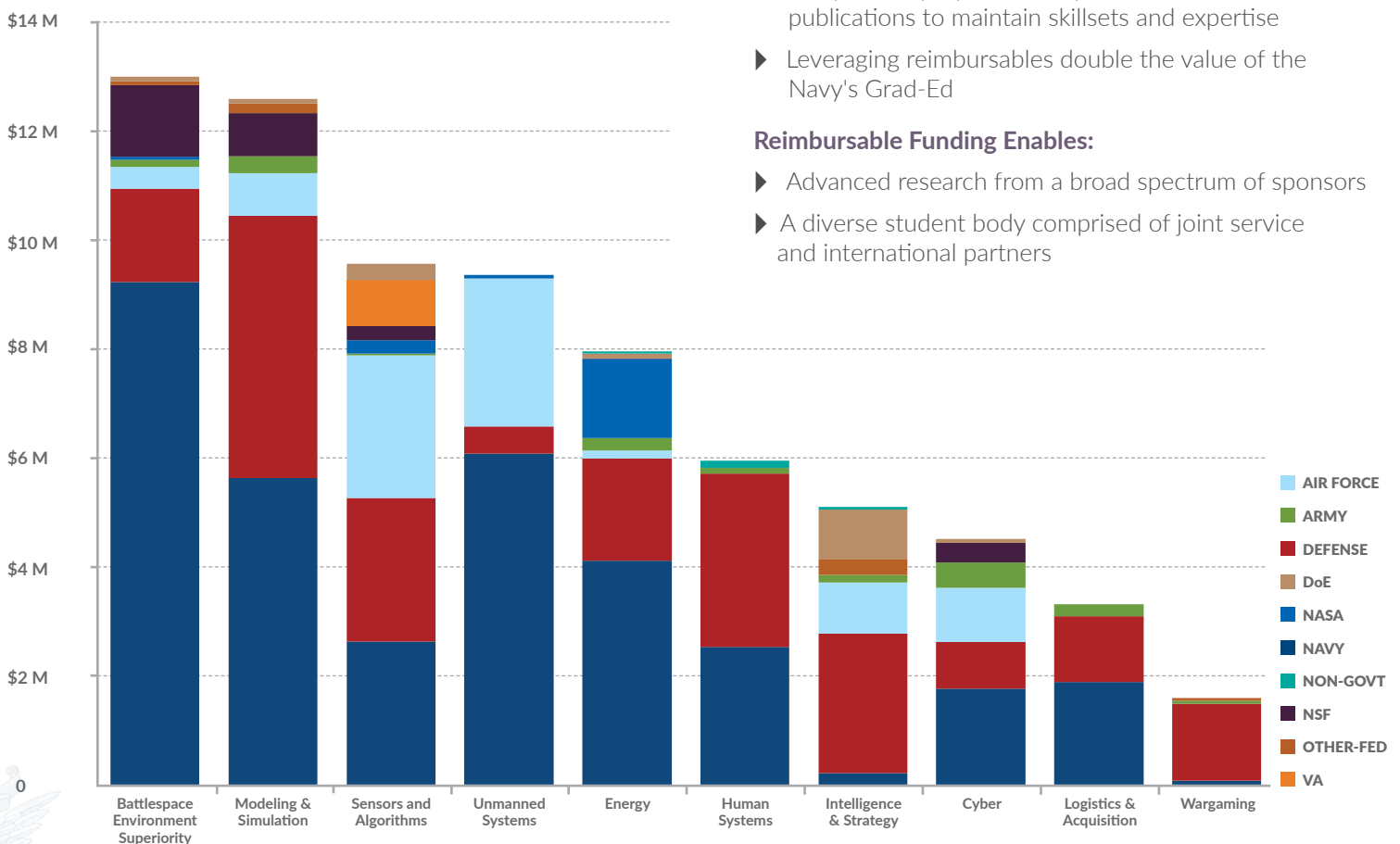


Research & Innovation Support:

- ▶ Operational relevance through resource sponsors
- ▶ Educational quality through theses and capstone projects
- ▶ Faculty recruitment, retention & relevance with competitive proposals and peer-reviewed publications to maintain skillsets and expertise
- ▶ Leveraging reimbursables double the value of the Navy's Grad-Ed

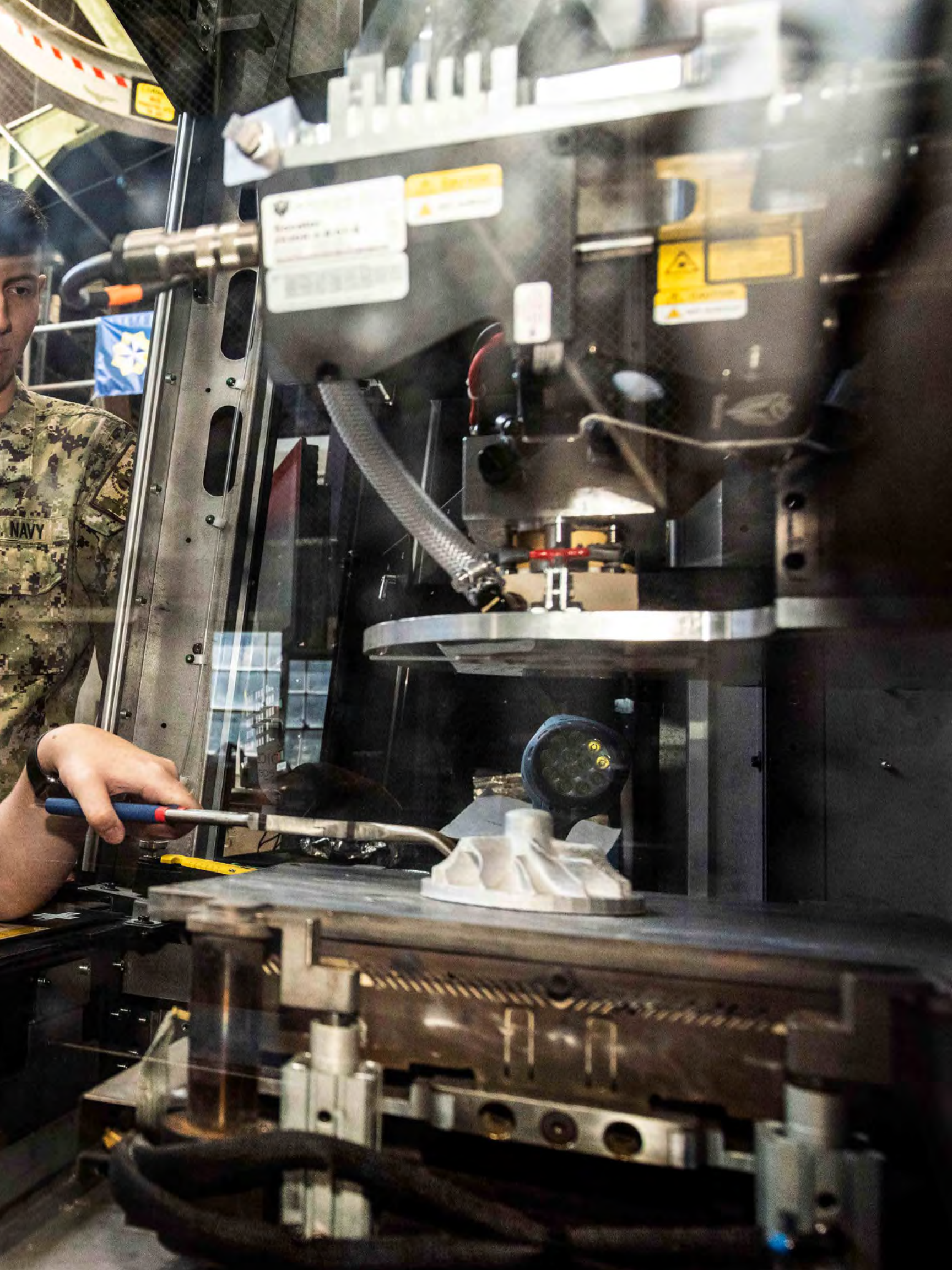
Reimbursable Funding Enables:

- ▶ Advanced research from a broad spectrum of sponsors
- ▶ A diverse student body comprised of joint service and international partners





At the cutting-edge of additive manufacturing technology, the Xerox ElemX 3D Liquid Metal Printer is used by NPS students in Large Experiment Annex on campus. As the first site anywhere in the world to install this new technology, NPS students and faculty make parts and test operating concepts. In 2022, NPS partnered with Commander, Naval Surface Force, U.S. Pacific Fleet (COMNAVSURFPAC) to install the second ElemX on the USS Essex (LHD 2) during Rim of the Pacific (RIMPAC) exercise to participate in the initial testing and evaluation of the metal printer during underway conditions.



PATENTS



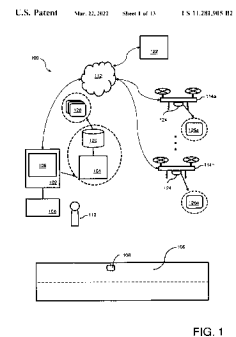
PATENTS

2022 Patent Examples

SYSTEM AND METHOD FOR UNMANNED AERIAL VEHICLE (UAV)-BASED FOREIGN OBJECT DEBRIS (FOD) DETECTION

Yakimenko, Oleg; (The United States of America, as represented by the Secretary of the Navy, Washington, DC (US) 2022-03-22).

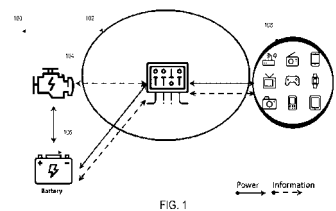
A computer-based system and method allows a user to automatically aerially inspect a selected runway/taxiway/tarmac surface for foreign object debris (FOD) using a plurality of UAVs equipped with electro-optical (EO) sensors. Live images of the runway surface captured by the EO sensors are transmitted from the UAVs during an inspection sweep of the runway surface and are compared with FOD free reference images of the runway surface to determine whether candidate FOD are detected on the runway surface. Information about and images of candidate FOD are displayed to the user allowing the user to determine whether to send a team to remove the FOD from the runway.



BI-DIRECTIONAL CHARGING PANEL

Fleming, Austin Galya; Geiss, Elizabeth Ann; Rathwell, Benjamin William; Pollman, Anthony Gerard Pollman (The United States of America, as represented by the Secretary of the Navy, Washington, DC (US) 2022-04-05).

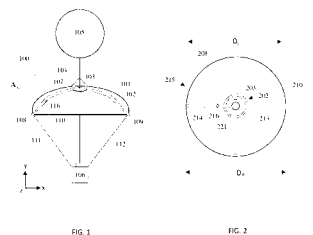
The invention relates to a bidirectional charging panel (BCP). The BCP includes a relay for controlling a combustion engine and a battery voltage sensor for monitoring a battery voltage. The BCP also includes a grid switch to transfer continuous power between the battery and a grid interface, where the grid interface further includes a grid voltage sensor for monitoring a grid voltage of a grid of devices and a grid direct current outlet to transfer power to and from a grid of devices. The BCP also includes a controller to manage the flow of power between the battery and the grid of devices, where the controller uses the relay to start or stop the combustion according to the battery voltage and uses the grid interface to transfer power from the grid of devices to the battery in response to determining the battery voltage is lower than the grid voltage.



HIGH-ALTITUDE PAYLOAD RETRIEVAL (HAPR) APPARATUS AND METHODS OF USE

Yakimenko, Oleg; (The United States of America, as represented by the Secretary of the Navy, Washington, DC (US) 2022-05-17).

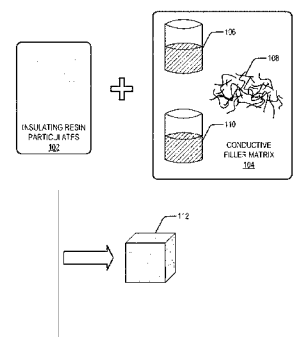
The disclosure provides an HAPR apparatus comprising an inflatable frame configured to generate canopy extension based on surrounding atmospheric pressure. The inflatable frame has a first collapse load limit less than the weight of the canopy at a first pressurized state less than 75 kPa and a second collapse load limit greater than the weight of the canopy at a second pressurized state of greater than 95 kPa. The internal pressure of the inflatable frame is typically about 101 kPa. The HAPR apparatus allows ascension with the canopy hanging under its own weight to reduce ascension time, then generates canopy extension prior to release in essentially a zero velocity, zero dynamic pressure condition.



FABRICATION OF EXCLUDED VOLUMES TO ENHANCE ELECTRICAL CONDUCTIVITY OF POLYMERIC COMPOSITE

Luhers, Claudia Catalina; Grbovic, Dragoslav; Phillips, Jonathan; Earp, Brian; (The United States of America, as represented by the Secretary of the Navy, Washington, DC (US) 2022-08-23).

A composite material with enhanced electrical conductivity. The composite material includes two distinct phases. The first distinct phase is an excluded volume phase that includes an electrical insulator. The second distinct phase, a conductor phase, is a composite including an electrically insulating matrix and an embedded conductor phase that has sufficient concentration to exceed a percolation threshold within the conductor phase.



NPS Dept. of Oceanography faculty, from left: Drs. Wieslaw Maslowski, Jackie Clement-Kinney, and Younjoo Lee are among the school's leading researchers on the polar environment, helping NPS students, and the Naval Oceanography community, advance the Navy's Blue Arctic strategy.





EXECUTIVE EDUCATION & PROFESSIONAL DEVELOPMENT



Executive Summary

The Naval Postgraduate School (NPS) extends world-class executive education and professional development (EE/PD) programs to mid-and senior-grade professionals who are unable to take the time out of their careers to attend degree programs, or who need targeted information at their locations on their time schedules. In addition to degree and certificate courses offered for credit, Schools, Centers, Departments, Institutes and other organizations of NPS provide executive education, numerous short courses, seminars, fly-away teams and conferences to meet specific sponsors' needs. NPS' short courses do not award academic credit, but selected short courses may award continuing education units (CEUs).

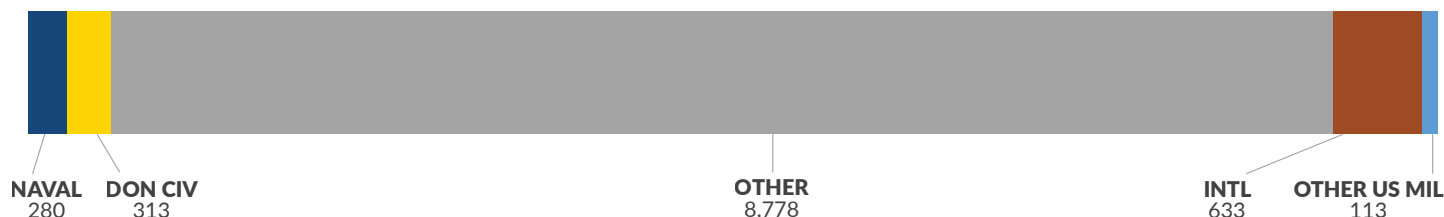
The primary organizations involved in EE/PD at NPS are:

- ▶ Center for Homeland Defense and Security (CHDS)
- ▶ Center for Security Cooperation Support (CSCS)
- ▶ Defense Resources Management Institute (DRMI)
- ▶ Center for Executive Education (CEE)
- ▶ Center on Combating Hybrid Threats (CCHT)
- ▶ Academic Units (EAG, IS, MAE)

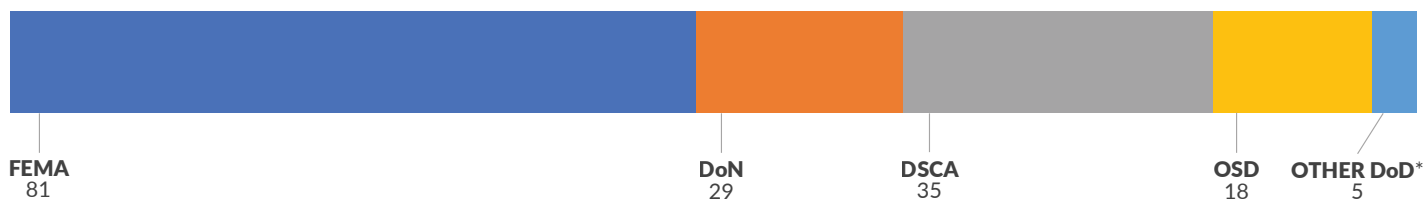
This year's sponsors include:

- ▶ Federal Emergency Management Agency (FEMA)
- ▶ Defense Security Cooperation Agency (DSCA)
- ▶ Joint Aircraft Survivability Program (JASP)
- ▶ Office of the Secretary of Defense (OSD)
- ▶ United States European Command (USEUCOM)
- ▶ Naval Air Systems Command (NAVAIR)
- ▶ Office of the Chief of Naval Operations (OPNAV)
- ▶ Chief of Naval Personnel (CNP)
- ▶ Office of Naval Research (ONR)
- ▶ Deputy Assistant Secretary of the Navy (DASN)

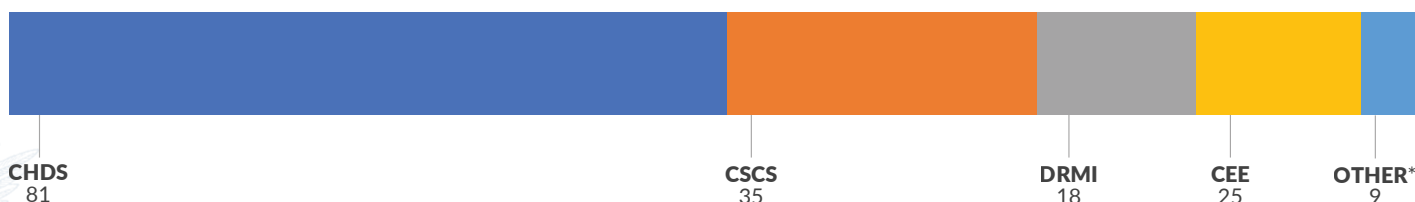
TOTAL STUDENTS BY AFFILIATION
(10,117 Total Students)



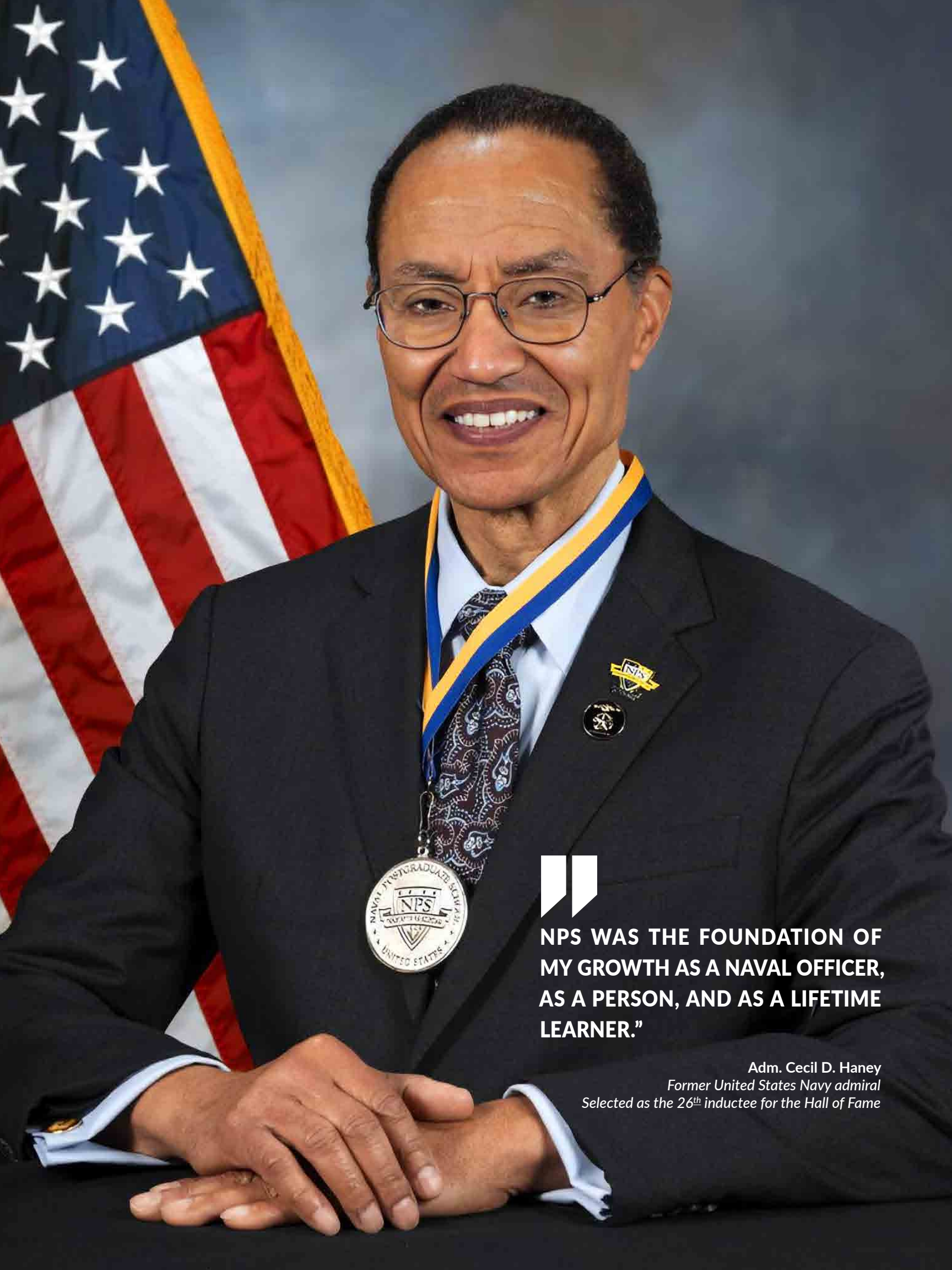
TOTAL COURSES BY SPONSOR
(168 Total Courses)



COURSES BY ORGANIZATION
(168 Total Courses)



*Other includes: EAG, CCHT, MAE and IS

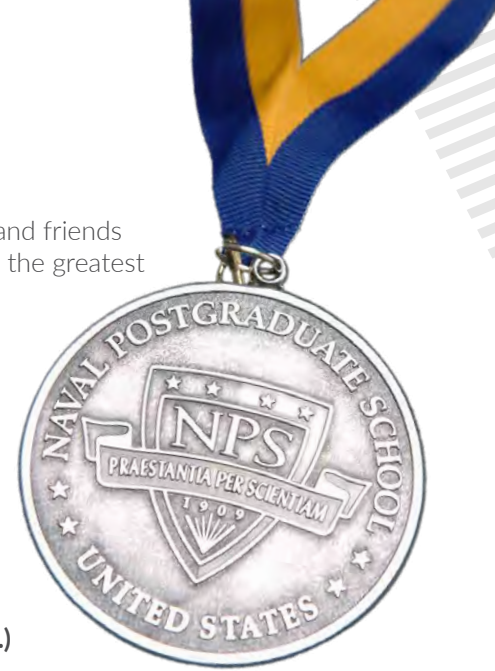


**NPS WAS THE FOUNDATION OF
MY GROWTH AS A NAVAL OFFICER,
AS A PERSON, AND AS A LIFETIME
LEARNER.”**

Adm. Cecil D. Haney
*Former United States Navy admiral
Selected as the 26th inductee for the Hall of Fame*

NPS Hall of Fame Honorees

The NPS Hall of Fame recognizes the accomplishments of NPS' most distinguished alumni and friends who, through the attainment of positions at the highest levels of public service, have made the greatest contributions to society, their nations and to the Naval Postgraduate School.



The Honorable Robert O. Work
(Inducted 23 Sep 2022)

Vice Admiral Edward Moore Jr. (Ret.)
(Inducted 26 Jan 2021)

Vice Admiral Jan E. Tighe (Ret.)
(Inducted 15 June 2018)

The Honorable Jack R. Borsting
(Posthumously inducted 27 Apr 2017)

The Honorable Everett Alvarez, Jr. (Ret.)
(Inducted 27 March 2015)

General Keith B. Alexander, USA (Ret.)
(Inducted 21 June 2013)

Colonel Walt Havenstein, USMCR (Ret.)
(Inducted 30 Nov 2012)

Admiral Eric T. Olson, USN (Ret.)
(Inducted 30 Nov 2012)

Admiral Stanley Arthur, USN (Ret.)
(Inducted 2 Dec 2011)

Dr. J. Phillip (Jack) London
(Inducted 2 Dec 2011)

Vice Admiral Pat Tracey, USN (Ret.)
(Inducted 3 Dec 2010)

Admiral T. Joseph Lopez, USN (Ret.)
(Presented 3 Dec 2010)

Vice Admiral Thomas J. Hughes, USN (Ret.)
(Posthumously inducted 3 Dec 2010)

General Apichart Penkitti, Permanent Secretary for Defense, Thailand (Ret.)
(Inducted 30 July 2010)

Admiral Michael Mullen, USN (Ret.)
(Inducted 11 Aug 2009)

General Michael Hagee, USMC (Ret.)
(Inducted 23 May 2009)

The Honorable Dan Albert, Mayor of Monterey (Ret.)
(Inducted 23 Feb 2007)



For the full list of Hall of Fame honorees and inductees see: nps.edu/web/alumni/hall-of-fame



VISION

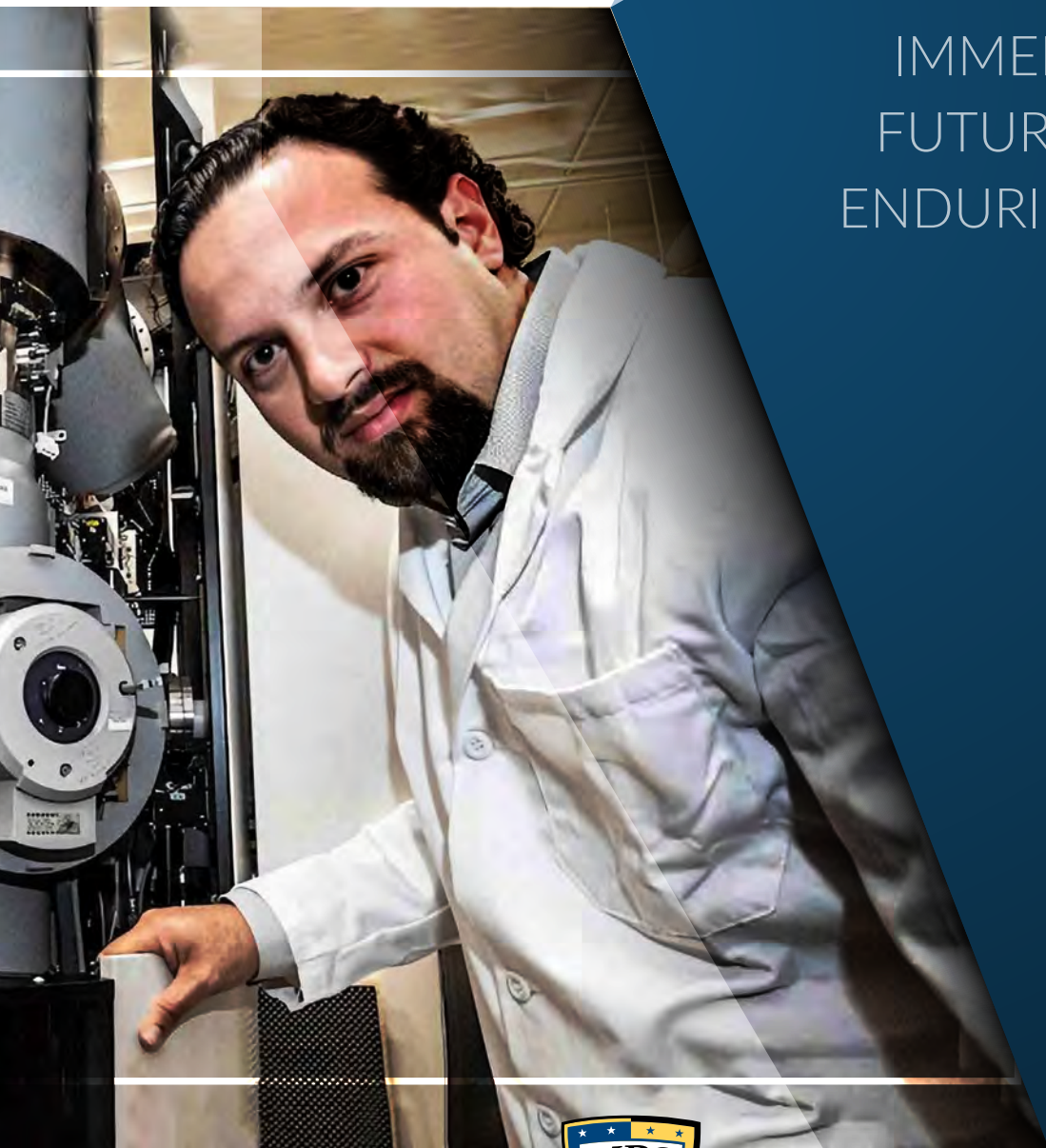
The Naval Postgraduate School will become the nation's leading institution for defense higher education and applied research, delivering transformative solutions and innovative leaders for decisive U.S. seapower and national defense.





NPS mourned the loss of Dr. Andy Nieto, a rising star in the Mechanical and Aerospace Engineering department that passed away in a tragic accident at the young age of 33 while doing something he loved, scuba diving in the Monterey Bay.

IMMEDIATE IMPACT
FUTURE ADVANTAGE
ENDURING LEADERSHIP



OFFICE OF UNIVERSITY COMMUNICATIONS
NAVAL POSTGRADUATE SCHOOL

1 University Circle, Monterey, CA 93943
pao@nps.edu | www.nps.edu

