



NAVAL POSTGRADUATE SCHOOL

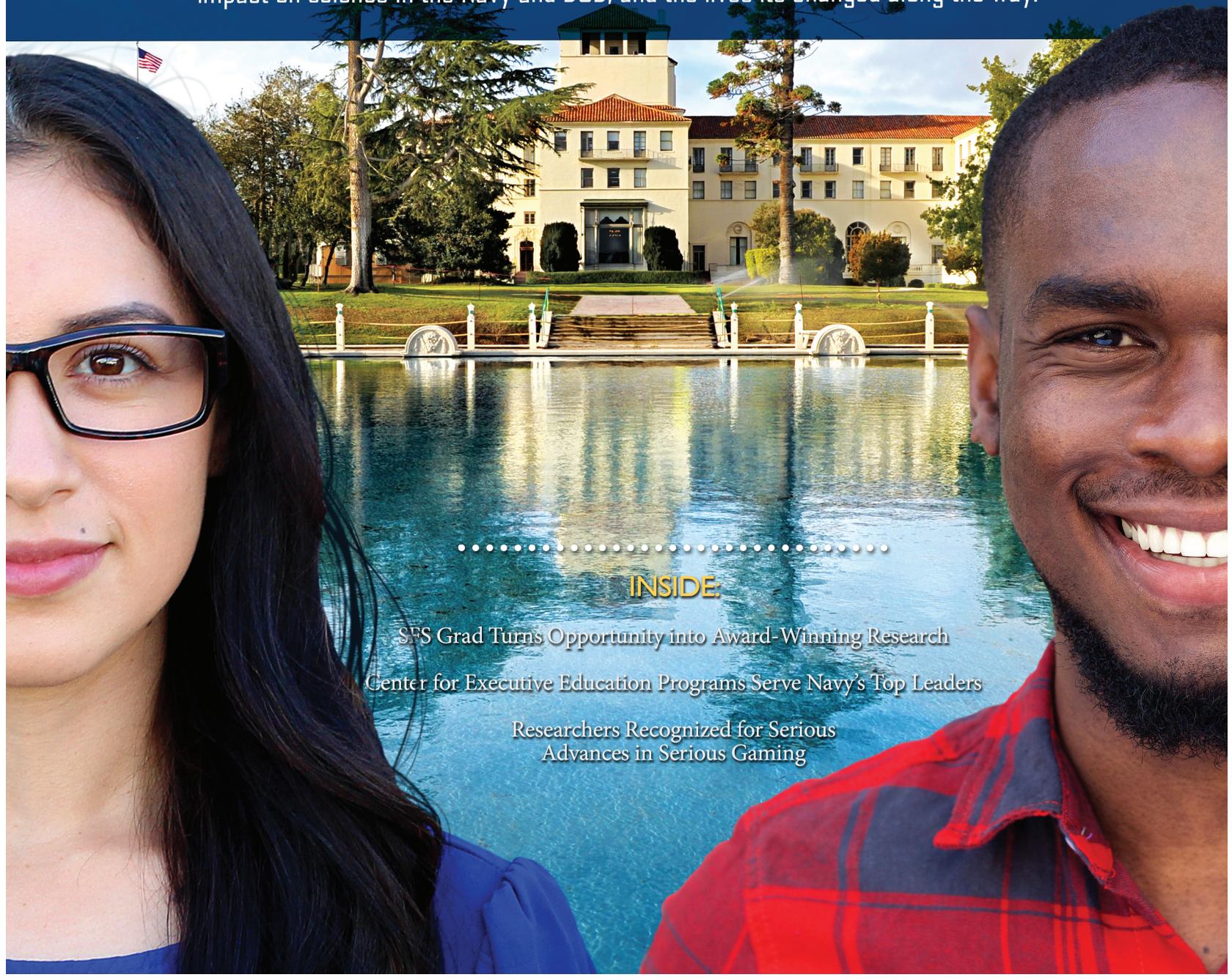
# IN REVIEW

MAGAZINE

FALL 2018

# #MYSUMMERATNPS

After a dozen years and 600 summer STEM internships, NPS looks back at its impact on science in the Navy and DOD, and the lives its changed along the way.



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SFS Grad Turns Opportunity into Award-Winning Research

Center for Executive Education Programs Serve Navy's Top Leaders

Researchers Recognized for Serious  
Advances in Serious Gaming

# PRESIDENT'S MESSAGE

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**Ronald A. Route**  
Vice Adm., U.S. Navy (Ret.)  
President, Naval Postgraduate School

*“The NPS STEM Internship program is one of the brightest feathers in our cap ... It invigorates and energizes our students and faculty, it advances our research, and perhaps most importantly, it changes lives.”*

Each quarter, “In Review” highlights some of the best events and achievements that NPS has to offer. Between the professionalism of our students, the quality of our faculty, and the relevance of our mission, there are bound to be countless programs we can showcase with great pride.

One of these such efforts is our science, technology, engineering and mathematics, or STEM internship program. Over the past several years, fresh-faced young men and women from universities around the nation, and high schools across the region, have spent their summers on campus. Their presence is quite noticeable, and more importantly, quite welcome!

Each year, the Provost and I have the honor of personally meeting the group, hearing first-hand some of their passions and interests. Towards the end of their experience on campus, we are treated to a series of research showcase events, where our interns present their research to their peers, and our students and faculty.

Each year, I grow more impressed with these scientists of tomorrow. Their intelligence, commitment, work ethic and inquisitive passion is infectious. To hear their stories, and the opportunities now presented to them because of this internship ... It's simply an honor to have them on campus.

The NPS STEM Internship program truly is one of the best programs we utilize to reach out into the community. ... It invigorates and energizes our students and faculty, it advances our research, and perhaps most importantly, it changes lives. There simply is a lot to be proud of, and only a small portion of it can be highlighted in this latest edition of “In Review.”

For example, another of our programs designed to bring new talent into critical fields is the Scholarship for Service and Monarch programs, which target high-performing candidates post undergraduate who may be looking to transition into a new field. Elizabeth Wanic, one of our most recent Monarch graduates, is the perfect example.

An anthropology undergraduate, Wanic wanted to transition into the cyber field, and she successfully applied her diverse experience, and her commitment to cyber defense, into an award-winning thesis on deterrence in the cyber domain.

We also highlight our Center for Executive Education (CEE), a component of the Navy's Executive Development Program. Through a portfolio of existing seminars and workshops, looking at how to lead innovation, or think and communicate strategically, CEE is firmly established as one of the best opportunities for Navy and Marine Corps leaders to grow and evolve.

Like our STEM internship program, and all of the efforts highlighted here in “In Review,” these programs reflect our best efforts to impact the effectiveness of our U.S. Armed Forces and those of our partners. Be it through a youth's inspiration, a career's transition, or a leader's evolution, these programs truly are making a difference, and changing lives.

*Ronald A. Route*



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## On The Cover

A fledgling internship program for regional community college students emerged in 2006 on the NPS campus in response to the DOD's call to encourage youth interest in STEM—or Science, Technology, Engineering and Mathematics—disciplines. Now a dozen years and more than 600 internships later, a robust, well-executed effort is single-handedly making a serious dent in the future STEM workforce ... and changing a lot of lives in the process.

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**Published by the  
Public Affairs Office**

*For more information about the Naval Postgraduate School, visit NPS on the web at [www.nps.edu](http://www.nps.edu). For free subscription information or to submit your comments or suggestions on "In Review" magazine, contact [dmkuska@nps.edu](mailto:dmkuska@nps.edu).*

## Secretary of the Navy Reveals the Next President of NPS

Secretary of the Navy Richard V. Spencer announced, Oct. 10, that Dr. Ann Elisabeth Rondeau, retired Vice Adm., will serve as the next president of NPS. Spencer made the announcement during an all-hands call with students, faculty and staff where he praised Rondeau for her proven experience as an educator.

"Admiral Rondeau brings with her an unparalleled record of leadership and achievement as a university president, change agent, officer and leader," said Spencer. "At every level, she's been a champion for students, teachers, and cutting-edge research, and I am confident she is the right person to build on the great evolutionary work that's been done so far to take this institution, and the naval enterprise it serves, to the next level."

Rondeau, a 38-year Navy veteran, currently serves as president of the College of DuPage, a two-year community college network serving more than 28,000 students in Illinois, and previously served as president of National Defense University. For NPS, she becomes the 50th individual to serve as the university's president/superintendent over its long history of defense-relevant graduate education and research.

"This opportunity to serve and help lead the Naval Postgraduate School is a privilege and honor," said Rondeau. "NPS is a brilliant place where individual and collective genius come together in teaching, learning and exploration, resulting in the premiere educational research institution in all of DOD.

"Secretary Spencer's intent and strategic vision for NPS is loud and clear, strong and validating," she continued. "His guidance is a clarion call for excellence, intellectual heft and engagement, and strategic positioning and impact. With the clear support of Secretary Spencer, the Chief of Naval Operations and the Commandant of the Marine Corps, as well as the treasure

in talent and dedication by the NPS community, we will take this university to the next level of effect."

Rondeau will replace current NPS President, retired Vice Adm. Ronald A. Route, following the completion of his five-year term at the helm of the institution. Spencer took the opportunity during his address to recognize Route for an exemplary five years of leadership at the university, presenting him with the Navy Distinguished Civilian Service Award, the highest award the Secretary can present to a civilian employee.

"Admiral Route has been the much-needed steadying hand as NPS regained its position as a pre-eminent educational and research enterprise," said Spencer. "His leadership as an educator, businessman and officer will live on in the achievements of all of those students lucky enough to have benefited by his experience."

"It has truly been an honor to serve as President of the Naval Postgraduate School, an institution that I have held in the highest regard since I was a student here in the operations research program," said Route proudly.

"Throughout my career on active duty, I witnessed graduates from this university return to their demanding jobs well prepared to be leaders and experts," he continued. "Over the past five years, it has been my privilege to witness first-hand how this institution's students and faculty work together to achieve this, while simultaneously driving innovation and change in our Navy and the Department of Defense.

"To these students, past and present, and to our excellent faculty and dedicated staff, I express my sincerest appreciation and thanks, and I look forward to seeing this institution continue to thrive in the years ahead," he added.



Secretary of the Navy the Honorable Richard V. Spencer, right, presents NPS President retired Vice Adm. Ronald A. Route, left, with the Navy Distinguished Civilian Service Award for serving as the university's top leader for the past five years. Spencer's visit to the institution, Oct. 10, announced the selection of retired Vice Adm. Ann E. Rondeau, inset, as the institution's next president.



### Annual Workshop Envisions Future Use of Unmanned Systems

NPS' Consortium for Robotics and Unmanned Systems Education and Research (CRUSER) held its annual Warfare Innovation Continuum (WIC) Workshop, Sept. 17-20. The WIC is a coordinated effort to execute a series of cross-campus education and research activities that share a central theme, with the WIC

serving as the kick-off event.

This year, the program is focused on the application of emerging technologies in future cross-domain operations. During the workshop, NPS student participants paired with seasoned mentors from across the fleet, industry and academia to explore in detail this futuristic scenario of naval warfighting.

"What we wanted to do was create an environment where we combined early career engineers with our own officers and



put them in a setting where they would access, using subject matter and technical expertise, the value of the technology we would present to them," said NPS Chair of Systems Engineering Analysis retired Navy Capt. Jeff Kline.

"What happened was, we ended up with a unique blend that uses the techniques of wargames and design thinking, as well as basic concept development, and

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the synergy that has occurred is just fantastic,” Kline added.

The workshop’s keynote address focused on the challenge of bringing innovative ideas to market, and was delivered by Vice President of Defense Acquisition University (DAU), retired Marine Corps Brig. Gen. Frank Kelley.

“For you students at NPS, you will never forget your time here,” said Kelley. “Having time to think with other people, some of which think like you, and more importantly some of which don’t at all, is one of the most important moments in your time in the military.”

Now in its 11th iteration, the

WIC correlates with a series of classes to create a model where the participants are actively thinking about the potential for unmanned and autonomous systems, helping drive concepts around campus and seed the development of new technologies.

“Over the past three days, we brought warfighters, civilians from the warfare center, academics and industry together for a design thinking experience to try to craft a way we may use unmanned and autonomous systems in the future,” said CRUSER director Dr. Brian Bingham. “Robotics and unmanned systems are not something that live in one particular domain, and we have to have

those inputs in order to be heading in the right direction.”

## Cameroon’s Top Admiral Explores NPS

Rear Adm. Jean Mendoua, Chief of Staff of the Cameroon

Navy, took an opportunity to learn more about NPS education and research programs during a visit to campus, Aug. 1-2.

Mendoua toured several research labs, and explored programs of potential interest to



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## A Bigger, Better Discover NPS Day

In the early morning hours of October 26, the gates of the Naval Postgraduate School (NPS) opened to the eyes of the world – or at least to the Monterey Peninsula – for the university’s annual Discover NPS Day.

Throughout the day, an estimated 2,200 school children, along with their accompanying teachers and parents, and community members from across the Monterey region, streamed through the campus to touch, build, drive and be inspired by experiencing what actually happens on the other side of the university’s gates.

“This was an opportunity for us at NPS to really give back to the community,” said Navy Cmdr. Paula Travis, Program Officer for the meteorology, oceanography and undersea warfare programs who donned the hat of Discover NPS Day Committee Chair this year. “Without the community, we wouldn’t be able to recruit world-class faculty or offer the highest quality of life for our military officers and service members, so this is a chance for us to give back to them, and to show the community what we really do here.”

Groups of 15-20 kids, ranging from 5th grade through high school were led across the campus by volunteer NPS student ambassadors to a broad range of compelling venues. They spoke with astronauts; hacked Wi-Fi networks; launched rockets; battled with robots; dined in the Grand Ballroom of the historic Hotel Del Monte; walked around a virtual reality replica of



Osama bin Laden’s compound in Abbottabad, Pakistan; joined Dumbdore’s Army and used social network analysis to defeat Death Eaters; and interacted with satellites, to mention a few of the many activities designed to demonstrate the kind of work the school’s students do.

Whereas the 2017 event focused primarily on science, technology, engineering and mathematics (STEM), the scope of activities broadened this year to provide a more holistic view of the campus’ work, including social sciences and national security affairs.

“We’re neighbors,” Travis said about the Monterey Bay area community, “and we want to welcome them into our home. Last year we opened our doors, and welcomed people into our game room, where all the fun science and technology happens.

“This year we wanted to take it to expand that,” she continued. “Not only do we want to show neighbors our game room, but also welcome them into the study, for

example, where we read books and write papers on compelling topics, keep mementos and fine art showcasing our history. We welcomed them into our living room, where we live life, relax and have fun together, and demonstrate who we really are.”

“That’s the important part of this ... We want to show people who we are, and everything we do to keep this nation safe,” she added.

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the security of his West African nation through briefings with the International Graduate Programs Office, the Defense Resources Management Institute and the Center for Civil-Military Relations, among others.

“The purpose of this visit is to strengthen cooperation between the United States and Cameroon, and we are here because NPS is an outstanding institution for defense strategy that we hope to work closely with in the future,” said Mendoua.

“Cameroon is facing a lot of threats, especially terrorism in the northern part of the country, and we hope to work closely with our allies to share our best ideas and collaborate, to take on terrorism in West Africa,” he continued. “NPS is a great institution to help meet that goal and this visit has gone far beyond all of my expectations.”

During the visit, current NPS student Cameroon Army Lt. Col. Stans Victor Mouaha-Bell briefed his thesis, which he is co-authoring with fellow Defense Analysis student U.S. Army Maj. Patrick Kerins. The analysis is focused on the multi-national force of Nigeria, Chad, Niger, Cameroon and Benin, and their efforts combating the West African terrorist group Boko Haram.

Both students have prior experience with the terrorist organization, with Kerins previously serving in Niger for six months with Special Operations Command Africa, while Mouaha-Bell has taken part in counter-Boko Haram operations for seven years in Cameroon.

“The first-hand experience that we both bring to the table helps us understand the terrain and the cultural dynamics of the

region,” said Kerins. “This allows us to further understand not only what actions their militaries have currently taken, but also sheds light on possible strategies they can implement.”

## Exchange Students Leave Their Mark on Networking Lab’s Research

After a year of research and discovery in NPS’ Center for Network Innovation and Experimentation (CENETIX), German exchange student Carsten Glose and South Korea’s Jung Hun Ryu returned home in August.

Civilians in their home nations, the two applied to spend a year at NPS through the Engineer and Scientist Exchange Program (ESEP) program, with their interests matched to NPS following a grueling selection process.

CENETIX leadership say Glose and Ryu significantly advanced the lab’s research into managing mesh networks, and in the modeling and simulation of ad hoc networks. Back home, Glose works for the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support, the German equivalent of the DOD’s office of acquisition and procurement. Ryu is a communications engineer and senior researcher working for the Agency for Defense Development in South Korea.

“My background is in computer science, so I conduct IT-related acquisition research, working closely with contracting officers, ensuring technical specifications are met as I provide a thorough study and report to my superiors,” said Glose.

During their 12 months of advanced research, Glose examined machine learning of semi-autonomous, intelligent mesh

networks, while Ryu discovered ways to optimize power consumption techniques within mobile ad hoc network nodes.

“Bringing these two researchers to NPS was an art and science of finding common ground. And luckily, the broad footprint of CENETIX research into networks gave us the opportunity to benefit from their insights,” Dr. Alex Bordetsky, director of the CENETIX lab, stressed.

## Industry Internship Program Continues Rapid Expansion

Early this year, NPS’ Student Services Office formally launched the Industry Internship Program to provide valuable internship experiences in partner-

NPS Dean of Students Navy Capt. Markus Gudmundsson. “When they come back, this experience not only helps form their theses, but can also guide their next courses of study, and even their careers as well.”

Each student spent one week in late September on site at several different locations learning the tools of the trade from top companies that include Amazon, Boeing, Lockheed Martin, the Elbit Corporation, Raytheon, the Cubic Corporation, AFWERX and Creare LLC.

Looking ahead, and seeing the value of the internship program to students, Gudmundsson says he hopes to continue growing the program. He envisions a program that is sending students for short



ship with leading industry and technology partners.

In the short time since, the university has more than doubled its participation in the unique program, sending a total of 20 students in its latest iteration to private sector partners, ranging from Amazon to Lockheed Martin.

“This program is meant to expose students to a different way of thinking with the hope that the brief exposure these students get to these companies will give them a deeper understanding of the fields they are studying,” said

industry experience internships throughout the year when class schedules permit.

“Ultimately, we are trying to improve the value of an NPS education,” he said. “Those in the fleet should see this as a fantastic opportunity to be exposed to things that they would not otherwise see ... It’s just one more reason to want to come here.”

For more information on this unique program, contact the NPS Dean of Students Office at [dosea@nps.edu](mailto:dosea@nps.edu).

## OC Prof Elected Chair of UN Commission



Dr. Peter Chu, Chair of the NPS Department of Oceanography, has been selected to serve as chairman of the Global Temperature-Salinity Profile Program (GTSP). The GTSP is a commission of the Intergovernmental Ocean Commission, part of the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the only UN body specializing in ocean science and services.

"I've been part of it for over 15 years," said Chu. "The GTSP provides world-wide, real-time temperature and salinity profile data three times a week. This is invaluable for numerical ocean prediction and model verification."

GTSP provides timely, complete sub-surface climate variables of temperature and salinity profile data with documented quality flags, and implements internationally-agreed quality control and overall management of ocean data in accordance with the Global Climate Observing System (GCOS).

As part of UNESCO, GTSP works unilaterally with different nations' government research entities to standardize global oceanographic data.

"The U.S. is a large country; however, we cannot sample water from all of the oceans. We have to get data from other countries, so you need to share this data. Quite a lot of countries participate and share," Chu noted.

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## Four NPS Faculty Recognized as Distinguished Professors

NPS recognized four of its top faculty by conferring the honored title of Distinguished Professor in recognition of their exceptional and sustained scholarly, teaching and service accomplishments.

Dr. John Arquilla, Department of Defense Analysis; Dr. Moshe Kress, Department of Operations Research; Dr. John McEachen, Department of Electrical and Computer Engineering; and Dr. Clifford Whitcomb, Department of Systems Engineering, have been officially designated with the honored title, and were formally recognized during the Summer Quarter Graduation ceremony in King Auditorium, Sept. 21.

"This type of recognition and designation is very humbling for me," said Arquilla. "It puts me in company with many of my finest colleagues on campus."

"[The announcement] was a little overwhelming," recalled McEachen. "I was incredibly flattered when I had learned of my nomination, and that would have been enough for me. When I was told about my selection, it was very exciting and humbling for me to be inducted into this group."

Faculty members are nominated by their respective departments, and reviewed by a diverse board of their colleagues before selections are made. This year's honorees join a community of 45 current and emeritus faculty who hold the title of Distinguished Professor.

With more than 77 combined years of experience at NPS between the latest four designees, these faculty have left an indelible mark on countless students that have passed through their respective classrooms.

"It really is all about the students," said McEachen. "They are the long-term product that we are producing here. I think we do some really interesting research, but the students are usually the ones doing that research, and it's the students' understanding of that research that will persist long-term."

For Whitcomb, extending the NPS education



*Drs. Clifford Whitcomb, John Arquilla, Moshe Kress, and John McEachen, from left to right, become the newest faculty conferred with the honored title of Distinguished Professor, recognized for their exceptional and sustained scholarly, teaching and service accomplishments.*

to students off of campus has been a considerable point of satisfaction.

"I think being able to develop and support the ability to teach systems engineering to students who are not on campus is something I am very proud of," said Whitcomb. "We were able to deliver the education to warfare centers, system commands, and other commands around the country and even around the world."

In addition to the challenging and rewarding work each of the faculty has performed with students, they also uniformly expressed significant pride in the mission of NPS, and how the education and research underway on campus serves a higher purpose in U.S. national security.

"It's just such an honor and privilege to be able to work at NPS," said Whitcomb. "It's not just naval students, but students from across the Department of Defense. To be able to provide, on a consistent basis, their education across so many areas to all of those different students is really special and a reward in itself."

"I've always considered it a privilege to serve here, and it has certainly been an honor to work with the faculty across the campus, as well as our students from all of the services, and so many countries around the world," Arquilla added. "I truly could not imagine having a more rewarding experience anywhere else."

# FACULTY SHOWCASE

## NSA Faculty Celebrate Scholarly Milestone with 100<sup>th</sup> Book

Faculty in NPS' Department of National Security Affairs (NSA) celebrated a significant milestone in scholarly achievements this quarter with the publishing of their 100th book.

Dr. Robert E. Looney, NSA Distinguished Professor, has the honor of authoring the team's century mark title with his "Handbook of International Trade Agreements: Country, Regional and Global Approaches."

NSA department chair Dr. Mohammed Hafez says he is quite proud of the department's efforts to maintain the highest standards of academic scholarship.

"Our department is an interdisciplinary department that deals with politics, economics and history," said Hafez. "And part of what political scientists, historians and economists do is they publish. They have to publish for their own professional advancement, to establish their name in the field, and to inform students in the classroom with cutting-edge research.

"Publishing is very important on multiple levels, not the least of which is to inform the broader public, policy makers, and our officers about the issues that affect our national security," he continued. "Issues like terrorism, refugees, economic crises, the rising Russian threat, or the struggle over the South China Sea ... There are lots of topics that the public and our sponsors care about."

Dr. Scott Jasper, a lecturer in the department, says publishing is the

natural extension of a faculty member's research which, ultimately, is utilized in the classroom.

"My next book is on Russian cyber operations, and we have extensive discussions on the topic in my two courses this quarter," said Jasper. "Publications begin with the research the faculty does, which directly enhances the student learning experience."

Dr. Afshon Ostovar has authored several papers over the past few years, in addition to his book, "Vanguard of the Imam: Religion, Politics, and Iran's Revolutionary Guard."

"In order to teach our students well we need to be informed as much as possible on the topics we specialize in," said Ostovar. "The most effective way to do that is to remain engaged in our topics and publish, both of which help to further hone our expertise."



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While part of Chu's responsibility as chair is to ensure GTSP is fulfilling its obligations to the worldwide ocean science community, he also has the opportunity to shape GTSP programs for the future, and he already has a few ideas on new products. He also hopes his selection as chair can be leveraged to provide NPS researchers with greater access to relevant data.

### Barma Honored With Annual Hamming Teaching Award

NPS Department of National Security Affairs Associate Professor Naazneen Barma is the recipient of the 2018 Richard W. Hamming Teaching Award, presented during the Quarterly Awards Ceremony, Sept. 11.

"It's an incredible honor," said Barma, who teaches a range of classes in political economy. "I think there are a wide range of excellent teachers on this campus. I think we're really focused on the students and that's really important to me and the work that we do."

The Hamming Award recognizes an NPS faculty member who achieved excellence in the classroom, in thesis supervision, and in contributing to student education beyond the classroom.

"I've been incredibly fortunate over the course of my own education to have had outstanding teachers who imparted to me their enthusiasm for the subjects they were teaching," said Barma.



"That's become my abiding principle when I teach, to get across my excitement and passion for the topics that we're covering. I think that's something the students really respond to.

"It's an everyday pleasure and privilege to be teaching NPS students," said Barma. "They are dedicated public servants. To be able to engage with them on topics that I know that they've lived and

experienced is really valuable to me as a teacher."

Barma's work extends from the classroom as co-director of Bridging the Gap, a multi-university initiative to promote scholarly contributions to public debate and decision making on global challenges and U.S. foreign policy.

The Hamming Award is named after NPS professor emeritus Dr. Richard W. Hamming. Hamming's dedication to teaching and research are well known, specifically in the mathematics, computer science and telecommunications fields of study. Hamming taught at NPS as an adjunct Professor from 1976 to 1997.

## New Portal Accelerates NPS Tech Transfer

The NPS Research and Sponsored Programs Office (RSPO) announced a new partnership with TechLink, Sep. 27, to begin listing publicly-available patents on an online express licensing portal, which should dramatically streamline technology transfers to the private sector.

“NPS faculty and students are producing terrific results across a wide range of disciplines,” said Dr. Jeffrey Paduan, NPS Dean of Research. “It’s great that their work is now being highlighted on TechLink and made available to the world.”

The TechLink portal provides a transparent, easy-to-use application process, incorporating predetermined legal and financial terms so that prospective businesses can readily research and apply for licensing.

“Our patent portfolio is really, really large and impressive for the size of our institution, but they’ve basically been sitting on a shelf and nobody knows about them,” said Agata Maslowska, the RSPO technology transfer specialist who spearheaded the TechLink partnership.

“This is something new for us because it puts us out there with other laboratories to compete for business and spread the word of the wonderful things that are happening here at NPS,” she added.

TechLink then essentially acts as matchmaker, connecting prospective businesses with NPS.

“It’s good for both the warfighter and the economy when we can get these ideas transferred quickly,” said Joan Wu-Singel, senior technology manager at TechLink. “By listing them as express li-

enses, we can showcase these NPS technologies and create another avenue for success that moves at the speed of business.”

## Workshop Updates NPS Data Scientists on Current Research

Doctoral students from prestigious universities across the nation convened at NPS to share their latest research in data science and analytics, Aug. 27, during the second annual “Day of Data, Decisions and Defense” workshop hosted by the Operations Research (OR) department.



“The impetus is always meeting young, talented doctoral students working on challenging problems in defense and homeland security operations research,” said OR professor Javier Salmerón, who organized the event.

“It gives these students an opportunity to meet faculty working on related problems, and it gives us a perspective of current research being carried out by doctoral students in other departments that focus on operations research,” he added. “Fostering these relationships with faculty and students at other institutions is beneficial to NPS and the Department of Defense.”

The intense, day-long workshop covered a lot of ground, but was thematically organized along four topical areas: probabilistic risk analysis, optimization, statistics and Markov models. The presentations ranged from space surveillance sensors for collision

management to statistical models that predict human performance, and sophisticated algorithms to solve complex, nonlinear optimization problems, to name a few.

“This type of workshop serves as an example of NPS’ interest in cutting-edge research and offers other researchers from top universities the opportunity to see NPS and interact with our faculty, creating links for future collaboration,” Salmerón said.

This summer, NPS formed the interdisciplinary Data Science and Analytics Group (DSAG) to streamline the way data science is developed, taught and shared across the university and beyond.

“Through the DSAG, NPS will establish itself as the thought leader, educational nexus, and primary research coordinator for data science and analytics in the DOD,” Dr. Robert Dell, the OR professor tasked with leading DSAG, said at the time.

“There is an incredible demand for DSAG research and education,” he added. “In many ways, [DSAG] is a response to the overwhelming number of calls we get from government agencies looking for help.”

## Systems Engineering Professor Appointed Editor-In-Chief of Respected Journal

NPS Department of Systems Engineering Professor Clifford Whitcomb has been selected to serve as the new Editor-In-Chief (EIC) of “Systems Engineering”



journal, a bimonthly publication recognized as a respected, forward-looking archival resource for systems engineering and related fields.

“My experience in systems engineering at NPS has prepared me very well for my position as the EIC of ‘Systems Engineering,’” said Whitcomb. “Much of the basis for accomplishing systems engineering development in the past 50 years has come from defense and defense-related industries.”

Whitcomb joined NPS in 2005 shortly after the Department of Systems Engineering (SE) was tasked by the Naval Sea Systems Command to develop an SE curriculum for the education of naval engineering duty officers.

“I was able to begin my career at NPS by being a team member for the design, development and deployment of that systems engineering curriculum, and for the subsequent advancement of the development of systems engineering education and research for the Navy and DOD,” Whitcomb noted.

Whitcomb says he regularly encourages students to read “Systems Engineering” and similar journals that publish on SE-related topics. There are several papers authored by NPS SE faculty in the journal, and several NPS alumni have also been published in them. In the end, he says, professional journals like “Systems Engineering” can serve as important resources for our students as they begin developing their theses.

“By having the students develop an understanding that writing is making your thinking visible, and connecting them to journal articles, we are able to help them connect to the larger body of knowledge that is captured by archival journals and use these in their thinking and writing,” Whitcomb stressed. **IR**



Elizabeth Wanic completed her Naval Postgraduate School degree in computer science through the university's Scholarship for Service program. Graduating from NPS, September 21, Wanic turned an anthropology background into an award-winning thesis on cyber deterrence, recognized with two quarterly student awards.

## SFS Grad Turns Opportunity into Award-Winning Research

By MC2 Patrick Dionne

For the past 17 years, the Naval Postgraduate School (NPS) has offered a Scholarship for Service (SFS) program for its master's degree in computer science with a specialization in cybersecurity and cyber operations, providing a direct pathway to increase the size and diversity of the nation's cybersecurity talent pool.

And through the scholarship's "Monarch" option, the program has successfully transformed students from wildly-diverse backgrounds into respected leaders in the cybersecurity field, contributing across the national security space.

Take computer science graduate Elizabeth Wanic, for example, a distinguished graduate of the Summer 2018 cohort graduating on September 21. Wanic is a textbook example of the continuing success of the program, earning two respected academic awards for her research, the NPS Outstanding Academic Achievement Award for DOD Civilian, and the Rear Adm. Grace Murray Hopper Award, recognizing outstanding academic and leadership accomplishments in the study of computer science.

"I was not expecting this at all," said Wanic. "I worked very hard

while I was here, and even though it is great to get recognition for that, at the same time, I know a lot of my peers are also doing great things and deserve recognition as well."

Wanic's award-winning thesis examines existing deterrence theory and discusses its applicability in cyberspace. It sought to clarify misconceptions between cyber weapons and conventional weapons and outlines the implications these differences can have on the effectiveness of cyber weapons as a deterrent. Wanic also offers a compelling analysis on the motivations and expected outcomes of notional cyber operations taken by the U.S. and its adversaries, including Russia, China, Iran and North Korea.

"I wanted to do something that combined my past experiences with what I am doing now," said Wanic. "I previously worked for the United Nations for seven years, and I felt like this was a great way to join the two together.

"It started when I attended a seminar with Dr. Neil Rowe, who brought up his work with different international perspectives of cyber security and warfare," she continued. "After talking to him, I was able

to narrow it down to this specific topic.”

Rowe, a professor in NPS’ Department of Computer Science, would go on to serve as Wanic’s thesis advisor on her research, who said one of the biggest challenges in conducting this research was how to determine “different deterrence strategies and how they relate to different countries.”

“All of our students come here and learn new areas of expertise, and Wanic was able to take all the technical work she did in the classroom and apply it to solve new problems that could make a difference at the policy level,” said Rowe. “Most policy makers don’t understand too much on the difference between things such as nuclear and cyber deterrence, and Wanic’s thesis did a great job in clarifying that.”

Throughout her research, Wanic explored several possible deterrence strategies, including stockpiling cyber weapons, deception, indicting individuals, imposing sanctions, creating international agreements, retaliating with conventional weapons, improving defenses, developing automated counterattack mechanisms, and mounting offensive cyber actions, with her thesis ending with possible U.S. policy recommendations.

Perhaps equally impressive to her research, though, is Wanic’s background and experiences prior to enrolling at NPS, and how she was able to successfully transition into the cyber realm.

Wanic’s career with the United Nations (UN) provided her a variety of diverse experiences – a speechwriter in the New York headquarters focused on peace-keeping, and an administrative officer in the Joint Operations Center to name a couple. She worked for the UN’s Office for Coordination of Humanitarian Affairs, participating in efforts to remove chemical weapons from Syria in 2013, and she even embarked on two peace-keeping missions in the African countries of Mali and the Central African Republic.

“During my last job in the Central African Republic, one of the things I was in charge of was the technology side of the mission, and we had people that wanted to bring in more drone surveillance and other advanced technologies. At the time I was uninformed about the specifics,” admitted Wanic. “Over the course of several months, I got to know much more about the technology that was directed to the mission, and how nobody knew how to use it. This wasted opportunity made me think that, even in a really remote place, technology is critically important to everything that we are doing.”

This experience inspired her, she said, to make the career change into a technology-related field. And during a chance encounter with a former classmate from her studies in anthropology as an undergraduate, she learned of the SFS program, and the opportunity to obtain a master’s degree in computer science in exchange for two years of service in a government organization.

“In the beginning, I felt very lost because it was such a flood of new information, but with the help of classmates and professors and some hard work, I was able to succeed,” said Wanic. “I have gotten so much out of my time at NPS, I’ve learned an entire universe of terminology and understanding about cybersecurity.”

“Everyone can read news articles and hear what is being said, but to really understand what it all means has been really enlightening,” she added. “I know a lot more now about the U.S. perspective on all of these issues, because that perspective is a lot more focused here [at NPS]. It leads to an experience that you just can’t get anywhere else.”

Although her transition from anthropology into computer science was a challenging one, Wanic says her experiences at the U.N., although mostly non-technical in nature, provided her with a foundation that greatly benefited her chosen research topic.

“When you work at the U.N. you work with a very diverse group of co-workers who all provide a different perspective on every topic, even in your everyday discussion,” said Wanic. “You look at the issue through a more global perspective. With deterrence, you need to be

able to see from the other side’s eyes. I felt like working with a lot of international colleagues really helped me gain a more global perspective.”

Elizabeth Wanic  
Computer Science, 2018

Following her graduation at NPS, Wanic will begin working for the Federal Reserve Bank in New York City, focused on cyber threat intelligence for a national incident response team. Her responsibilities will include assessing and protecting vulnerabilities, as well working with incident responders and other team members to improve security from the ground up.

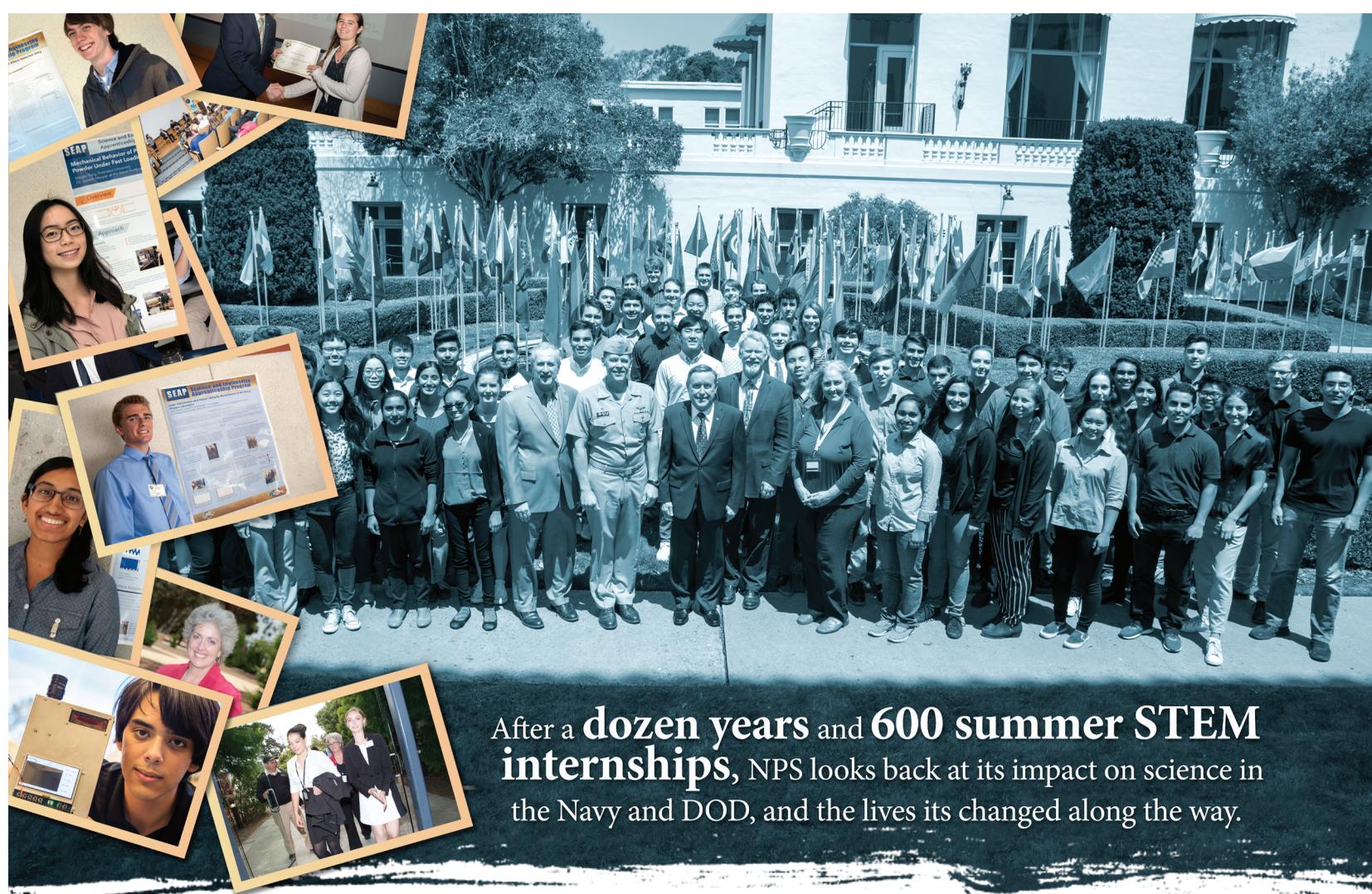
“It is a lot of analyzing and looking at the overall picture, which is more along the lines of what I had been doing prior. I liked the fact that I am going to be able to combine this analysis type work with some more technical work,” said Wanic.

“It’s a big step following my time at NPS and being recognized for my time here makes me proud, not only as a woman in a male-dominated field but as someone who is older starting a new career,” she continued.

“No matter what your background is, if you work hard and have the capability, you can achieve anything,” she added proudly. ■

“I have gotten so much out of my time at NPS ... Everyone can read news articles and hear what is being said, but to really understand what it all means has been really enlightening.”





After a **dozen years** and **600 summer STEM internships**, NPS looks back at its impact on science in the Navy and DOD, and the lives its changed along the way.

# #mySUMMERatNPS

By Matthew Schehl

When people hear where Casi Martin is from, they often don't believe it.

The 27-year-old intelligence specialist is engaged in some of the nation's most critical cyber operations at Fort Meade, Maryland, but she couldn't speak a lick of English until the 4th grade.

Growing up in agricultural Salinas, California, the immigrants' daughter had little interest in continuing her education after high school. Her parents hadn't made it passed middle school in Panama and Mexico, and Martin felt her own future seriously limited by social, cultural and economic constraints.

"I didn't think I was going to get a degree. I was kind of a troublemaker," she laughed. If it wasn't for a fluke enrollment, at her grandmother's insistence, in a computer science course at Hartnell Community College, who knows what her path would have been? Instead, the class awakened in Martin an innate gift ... programming.

"I was 18 and had never seen anything like it," she recalled. "I liked the challenge of programming and was really good at it ... So after one semester I switched my major over to computer science and I just kept going with it."

Martin's abilities didn't go unnoticed. Joe Welch, a retired Navy flight officer teaching computer science at Hartnell and the Naval Postgraduate School (NPS), encouraged her to look into a Science, Technology, Engineering and Mathematics (STEM) internship at NPS. This was in 2012, and that internship would prove to be a turning point on the road of Martin's future success.

After her internship, she transferred to California State University, Monterey Bay (CSUMB), obtained her undergraduate degree in computer science and immediately entered the Scholarship For Service (SFS) program back at NPS. By the age of 25, she had earned her master's degree through the university's Center for Cybersecurity and Cyber Operations (C3O) and went to work for the government as an Army civilian.

"I really don't see how my life would have gone," Martin said. "Part of it is luck, but more than that, I ended up being around very supportive people and mentors that cared."

Impressively, Martin's story is not unique ... She is one of hundreds of similar stories exemplifying NPS' role in positively contributing, directly or indirectly, to the national security of the United States.

Since 2006, a staggering 600-plus high school, community college

NAVAL POSTGRADUATE SCHOOL

and university students have participated in NPS' various internship programs, directly mentored by leading experts in their fields.

These students have gone on to pursue robust careers in service to science, to the military, and to government agencies. They are technologists, engineers, and even academics.

"The most important legacy of NPS' STEM internship program is the young people who have participated in them," said Dr. Steve Lerman, NPS Provost and Academic Dean. "The program educates the interns about how STEM research really works, and familiarizes them with technological problems that are of importance to the Navy and the rest of the Department of Defense."

Taking on technological DOD problems had been a defining characteristic of America's science community, but by the turn of the millennium, a well-documented gap in scientific interest had emerged. In 2001, the National Science Foundation coined the term 'STEM' when describing the mounting national crisis, and bipartisan efforts began prioritizing STEM education policy.

The U.S. military also embraced STEM education as core to its mission, with demand for computer scientists, engineers and signals intelligence professionals growing. NPS, with its long history of education and research in several STEM disciplines, was quick to answer the call. By 2006, a formal internship program was up and running at the university.

The timing couldn't have been better for Miles Hansen, a Hartnell student during the program's early years in 2007. Hansen wasn't particularly interested in the burgeoning field of robotics, but he really enjoyed mathematics, specifically differential equations. As he would many times over the years, Welch recognized the talent, although to Hansen, the prospect of an internship at NPS, only 17 miles from his native Salinas, was intimidating.

"NPS is a world-renowned school and it seemed like a great opportunity, but it just seemed crazy," Hansen recollected. "I mean, why would anyone give a [##\$%#] about a community college student like me?"

But they did, and with the encouragement of Hartnell faculty, Hansen applied and was accepted. He suddenly found himself conducting high-level research in mapping autonomy in robotics alongside NPS computer science department faculty and the school's military officer students. And Hansen soaked it in like a sponge ...

"The internship taught me how to learn to not be afraid to ask questions," he said. "If I have a question, that means I'm doing something right. If I don't have a question, that means I'm forgetting something."

Hansen transferred to the University of California, Santa Cruz, where

he earned his bachelor's degree in computer engineering, robotics and control in 2008, and has since worked in the Silicon Valley as a systems engineer.

"I had no idea that world even existed until NPS showed it to me," he said.

Hansen was one of the nascent NPS program's early participants, when coordinating internships at the university was ad hoc, perhaps even a bit uncoordinated. As the concern for STEM education grew, so did the need for a more formalized internship program.

But there was still something, or someone, missing ... A champion, a ring leader, a cat herder and a pitchman – and more – all rolled into one.

"The heavens opened and Alison appeared," Welch said. "She lent her incredible passion and organizational skills and the program just exploded."

That Alison is Alison Kerr, who at the time served as a program manager at NPS' youthful Cebrowski Institute, an innovation incubator of sorts before any of those were Beltway buzzwords.

"Basically, we would take on new projects and help them emerge," said Kerr, who took a particularly keen interest in helping NPS' youthful, albeit uncoordinated, internship program do just that ... emerge.

Kerr saw what Welch saw ... the enormous potential of this community of students within a stone's throw of NPS.

With support from NASA and the National Science Foundation, Hartnell College and NPS formalized the Community College Catalyst (3C) program. It would prove to be the foundation of a life-changing program for the Hartnell community.

"The STEM internship program at NPS for Hartnell students has been a key ingredient in the success of these students," Hartnell president Dr. Willard Lewallen said. "We are grateful to NPS for providing these rich learning experiences for our students."

Aaron Lopez was one of those students. Lopez also grew up in Salinas, attended Hartnell and, in 2011, made the jump from general science to applied physics through an NPS internship. He threw himself into his work and was able to extend the internship for a full year while remaining a full-time student. Today, Lopez is an astro-seismologist at the University of Wisconsin, Madison.

"I kept thinking, did I just get lucky? Did NPS really have this community of awesome people who would go to bat for you? But looking back, I see that they were actually looking for people like myself who were very motivated," he said.



**It was the first time I got hands-on engineering experience. I really think that was my lynchpin; I don't think that I would be where I am now without that initial boost.**

**-Lauren Polo, Intern**



# #mysummer

## — BY THE NUMBERS —

**91%** **45%** **63%**



of Hartnell interns at NPS have transferred to a four-year institution, earned an associate degree, and/or are still studying at Hartnell.

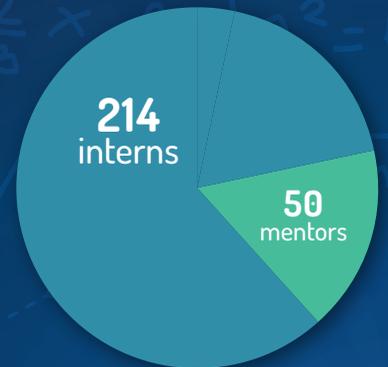


have earned a bachelor's degree and 44 percent are still in progress toward the degree.



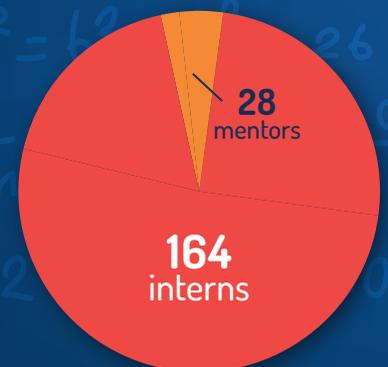
of interns contributed to 33 NPS research projects under the guidance of 25 mentors in 13 different academic departments.

The Navy and DOD's, and the nation's, focus on advancing STEM education is not a recent development, and fortunately neither is the Naval Postgraduate School's robust internship program. Over the past 12 years, through the persistence and passion of dedicated staff, and the commitment and duty of university faculty and leadership, the NPS STEM Internship Program has achieved an impressive pattern of growth.



**GSEAS**

More important than numbers, however, is that each internship represents earth-moving potential. To date, more than 600 young men and women have spent a summer on the NPS campus, participating in the very same DOD-relevant research our officer students do. Some of them leave inspired, some of them change their hopes and dreams, and some commit even harder to the dreams they had when they got here.



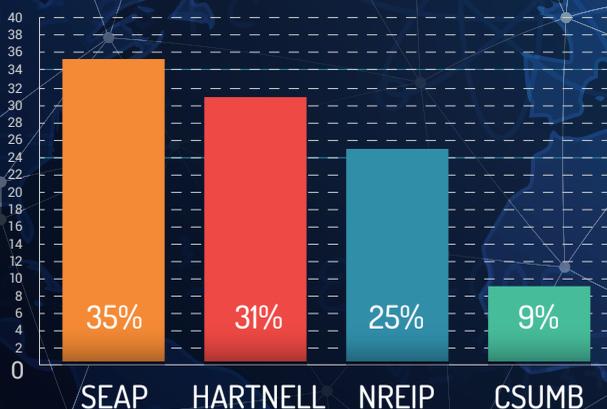
**GSOIS**

The point is, the next discovery that changes the world, or simply makes the Navy and the DOD a more effective force, will likely come from someone who was inspired to make that breakthrough. For every STEM intern the university serves, every individual our faculty inspire, we eagerly look forward to seeing what they will do.



**Other**

## 600 total STUDENTS



Source: NPS STEM Internship Program Office

# meratnps

## STEM OVER THE YEARS

2007-8



**JANUARY 2007:** began with 4 Hartnell college CS students

**AUGUST 2008:** NPS Awarded Hartnell Presidents Partnership of Excellence Award

2009-10



Built program and Hosted 13 Hartnell College CS and engineering students each summer

2011-12



**JUNE 2011:** NPS intern, Hartnell and Cal Poly SLO alum Genaro Sanchez presented at inaugural ONR Naval STEM Forum in Washington DC

**JULY 2012:** Hartnell summer interns participated in inaugural Cyber Adventurer program, peer mentoring Salinas middle schoolers in CS principles

**SEPT 2012:** Expanded NPS STEM program to include ONR's SEAP and NREIP

2013-14



**JUNE 2013:** Inaugural year, we hosted 17 NREIP and 19 SEAPS alongside 32 Hartnell interns

**JULY 2013:** Special visit to Oral Team America's Cup Headquarters in San Francisco

**JUNE 2013:** Udacity highlighted 2012 Hartnell intern Francisco's journey by marking his entry into the NPS SFS Program

**JULY 2013:** First PhD + Polka Dots gathering for female STEM interns to meet female NPS Faculty

2015-16



**JULY 2015:** First NASA AMES intern exchange

**AUGUST 2015:** Awarded First Annual Andy Newton STEM Internship Partner Award

**JUNE 2016:** Secured funding for local high school FIRST robotics teams with NPS mentor

**JULY 2016:** Local Girls Who Code program began with NPS intern

**AUGUST 2016:** Inaugural Regional STEM Symposium with CSUMB

2017-18



**MARCH 2017:** Educational Partnership Agreements established with Hartnell & Monterey Peninsula Colleges

**FEBRUARY 2018:** Educational Partnership Agreements established w/ California State University, Monterey Bay

**AUGUST 2018:** Congressman Jimmy Panetta attends Regional Research Symposium at CSUMB

# #mySUMMERatNPS SHARING OUR STORIES

Want to know more about some of the students who have spent their summer on the NPS campus? There are several great stories on the NPS YouTube channel waiting to be discovered! Check them out at: [www.youtube.com/NPSvideo](http://www.youtube.com/NPSvideo).



## NPS, CSUMB INTERNS SHARE RESEARCH DURING ANNUAL SHOWCASE

Summer interns from NPS' latest cohort presented their research projects during the Monterey Bay Summer Research Symposium at nearby CSUMB, Aug. 10, 2018. The symposium highlighted the STEM research of 65 interns participating in summer programs at NPS, CSUMB and Hartnell College. [youtu.be/fgRdymwv0c](http://youtu.be/fgRdymwv0c)



## STEM INTERNS MAKING WAVES AT NPS

Dozens of high school and college students descend upon the NPS campus every summer, interning with university faculty and researchers across nearly every department on the very same cutting-edge science and technology innovations our officer students explore. [youtu.be/J0hptQffTr8](http://youtu.be/J0hptQffTr8)



## STEM@NPS 2015

NPS' STEM internship program partners with the Office of Naval Research in supporting the Science and Engineering Apprenticeship Program (SEAP) and the Naval Research Enterprise Internship Program (NREIP) to bring high school and college students onto campus in the summer. [youtu.be/n6BElvuw4z8](http://youtu.be/n6BElvuw4z8)



« continued from page 13

“Being at NPS allowed me to see firsthand enough of a potential future to consider whether this was something I wanted to do,” Lopez continued. “That motivated me a lot more than anything else I have ever done.”

During these initial years, the 3C program continued to thrive, with countless student experiences just like Lopez’s. But Kerr was always laser-focused on how she could continue to grow and evolve the program, and make even more of a difference in the students’ lives.

“The majority of Hartnell students are first generation college-goers, so to even consider coming to NPS to intern was really scary for them,” Kerr said. “They were exceptionally intelligent, but what I discovered in talking with them was they had never been encouraged to talk about themselves.”

Kerr wanted to find a way to get these young people to advocate for themselves, to express their own interests. She wanted NPS faculty to hear about the students’ skills in their own words. And she wanted interns to have an opportunity to be more informed when they were matched with faculty.

So, she borrowed an idea from a different sort of matchmaking ...

“What I did was I told everyone we were going to speed date,” Kerr said proudly. “Interns and mentors get three to five minutes, one-on-one, to narrow in on non-negotiables. It’s fast and furious, and it’s fun.”

Former intern Lauren Polo remembers her speed session like it was yesterday. The Hartnell freshman had just graduated high school, and although she had a general interest in STEM, really had no idea what direction she wanted to go in.

“It was actually really cool. It gave all the prospective interns and mentors a chance to not only get to know each other, but for us to figure out what project each of the teams were working on,” Polo recalled. “We’d get five minutes per mentor, and then the students would switch. After that we put down our top three people that we wanted to work for. The faculty did the same, and we were matched up.”

Over her summer-long internship, Polo worked for Dr. Jim Newman, former NASA astronaut and chair of the Space Systems Academic Group. Sitting alongside NPS graduate students in a research lab designing, building and programming high-altitude balloons to collect atmo-

spheric data, Polo listened to Newman share space stories and talk about orbital mechanics.

“I knew from that moment on, the way he described it, that this was something I wanted to do,” she said. Polo went on to earn a degree in astronautics from California Polytechnic State University, San Luis Obispo, and today works as an aerospace engineer with Northrop Grumman. She looks back on the internship as her turning point.

“It was the first time I got hands-on engineering experience,” she said. “I really think that was my lynchpin; I don’t think that I would be where I am now without that initial boost.”

Still ever-focused on expanding the relevance of the program, Kerr saw an opportunity emerge in 2011 during the inaugural Office of Naval Research (ONR) STEM Forum. ONR was exploring potential collaborative solutions to the STEM education crisis in ways that would contribute to future operations and capabilities of the Navy and Marine Corps.

Kerr introduced approximately 300 Navy and STEM leaders to Genaro Sanchez, one of her many 3C success stories. To put it mildly, the account of his NPS experience was a home run!

“Genaro got up and told his story, and there was not a dry eye in the room,” Kerr recalled. “He received a standing ovation, and people just swarmed up to him afterward. He didn’t know what to do.”

ONR would go on to launch its own STEM internship programs, pairing naval research labs across the country with high school students through the Science and Engineering Apprenticeship Program (SEAP), and with university students through the Naval Research Enterprise Internship Program (NREIP).

Dr. Michael Simpson, ONR’s Director of Education and Workforce, called the programs “an integral part” of the Naval STEM education plan, “as these types of experiences allow students to participate in cutting-edge research at a Navy laboratory,” he said. “The work being done by Alison Kerr and her team at NPS gives interns direct access to leading faculty who are continuously working to cultivate a world-class STEM workforce.”

The next year, Kerr was able to bring SEAP interns onto the NPS campus, with NREIP interns joining the university’s program the following year. With these landmark changes, a new era for the NPS Summer Internship Program was born.

Every June, youthful, bright-eyed faces would start popping up all over campus, adding to the already robust 3C program. Each year, anywhere from 60-90 interns hit the halls of NPS each summer.

Of course, more interns means more faculty mentors required, but additional NPS faculty were not hard to come by. Faculty saw the program as an opportunity to serve the community and the Navy's STEM education initiatives. Additionally, with the interns well matched to the faculty's research programs, the influx brought a fresh perspective from highly-capable young scientists to advance the effort.

"Their support accelerates the pace at which we conduct our projects, and makes us active participants in the education of the country's future scientists, engineers and technologists," said Dr. Claudia Luhrs, Mechanical and Aerospace Engineering professor and an active mentor in the program. "For most of the interns, this is the first chance they have to participate in a research program, see the outcomes of the experiments, and be part of a research team."

"What we really try to do with these folks is give them things that they can really excel at," added Operations Research Professor Nita Shattuck, who has mentored 24 students since 2014. "Sometimes they have to do data entry, but this is all part of the science."

"They're so creative and they bring so much laughter and joy into the lab ... We all benefit from it," Shattuck continued.

Looking at the effort from a campus-wide perspective, NPS Dean of Research Dr. Jeff Paduan says the program has successfully aligned with standard research practices on campus.

"It has also been successful because faculty mentors derive inspiration from the interns and, in turn, the interns gain great practical experience," he said. "The interns bring fresh eyes, inspirational stories, and unbounded enthusiasm to the NPS research community."

Over the years, countless success stories have passed through the campus. Sam Zorek, for example, was one of the first local high school students to jump start his academic career at NPS through the SEAP program.

"I decided to apply to SEAP at NPS because it looked like an absolutely outstanding experience. Not only would I be able to pursue my interest in engineering, but I would be able to do so through real-world projects that contribute to the defense of our nation," Zorek said.

Zorek spent two summers at NPS, working with Dr. John McEachen, to develop malware to test cyber defenses during his first internship on campus. The second summer, he worked with Dr. Jim Newman and Lauren Polo developing high-altitude balloons.

Poised to receive his bachelor's degree in mechanical engineering

from Rice University this year, where he also serves as president of the undergraduate rocket team, Zorek credits his internships at NPS with teaching him to find meaning in his work, inside and outside of the classroom.

"My two summers at NPS exposed me to complex technical problems without a simple solution," he said. "When I started my engineering studies, and especially as I progressed to upper level and graduate courses, that ability I learned to deconstruct a nuanced problem into first principles has served me well."

Rhys Leahy, an American University international relations undergraduate, came to NPS through NREIP in the summer of 2016. Although her major was outside of the STEM core fields, she later developed a fascination with the physical sciences.

"I took as much elective coursework in STEM as possible and applied to NREIP," she said. "I just got really lucky that I matched with a mentor who was looking for someone who had a background in writing and ethics."

That mentor was Computer Science Professor Neil Rowe, who was researching cyber warfare issues, looking to expand into Russia's election interference making headlines at the time. Leahy set to work translating open source Russian language literature on cyber warfare strategy and ethical guidelines.

"It couldn't have been more fascinating," she recalled. "Coming into a STEM internship as an international relations student gave me a wide-angle lens on how science and engineering can be applied to most issues, and analyzing the conflict helped me develop a

nuanced understanding of cybersecurity."

The internship set Leahy up for success ... Upon returning to Washington, D.C., she contributed to an internship with NBC News, and is currently working as a science writer with the American Institute of Physics. Her goal is to work in a federal agency and to use her passion for science with her regional knowledge of Eastern Europe, with an eye towards eventual diplomatic work.

With Summer over, and the Fall Quarter now well underway, NPS' latest cohort of interns is back at their chosen universities, applying the knowledge and experiences gained on campus to their given fields of study. But it won't take long before the Fall turns to Winter, and then to Spring, and those youthful faces once again start showing up in labs across the campus.

After 12 years and 600 interns, however, the students' collective impact on the campus can be felt year-round. In time, that same impact will be felt across the Navy and DOD scientific community, if not the nation, as these interns become the innovative problem solvers of tomorrow's vexing defense challenges. **IR**



**Coming into a STEM internship as an international relations student gave me a wide-angle lens on how science and engineering can be applied to most issues, and analyzing the conflict helped me develop a nuanced understanding of cybersecurity.**

**-Rhys Leahy, Intern, Department of Computer Science**





A team of NPS researchers prepares to launch an unmanned aerial vehicle during an experiment in swarming unmanned systems at the latest Joint Interagency Field Experimentation (JIFX) program. JIFX provides academic, industry and military representatives with an environment to sandbox emerging technologies.

## JIFX Continues to Help DOD, Academia Explore Limits of New Technology

By Matthew Schehl

From the blistering tarmac at McMillan Airfield, a lightweight unmanned aerial vehicle (UAV) catapults off and directs itself into a forming swarm of fellow UAVs. A few hundred meters away, with its mission completed, a ScanEagle UAV autonomously swoops in to hook onto a dangling line for retrieval.

Twelve kilometers beyond the airfield, a pocket-sized UAV teaches itself to navigate a dense urban environment to recognize and follow a moving vehicle, while another UAV locates the survivors of a downed helicopter to airdrop relief supplies.

These are a just a few of the many experiments carried out at the latest Naval Postgraduate School (NPS) Joint Interagency Field Experimentation (JIFX), held Aug. 6-10 at the California National Guard's Camp Roberts.

"It really is a collaborative learning environment with minimal rules," said Dr. Ray Buettner, JIFX director and NPS associate professor of Infor-

mation Sciences. "People come out, interact and share information, and it's done with only enough structure to be safe, secure and legal."

Over the five-day event, NPS students and faculty, representatives from various U.S. military commands, and specialists from cutting-edge tech firms endured the sweltering heat to put a range of new systems to the test.

Next-generation unmanned autonomous systems (UAS); drone swarms (and techniques to counter them); UAS specific to humanitarian assistance and disaster relief missions; long-range communications; and, cyber resiliency experiments were all conducted over the course of the week, often with surprising results.

"It's OK to come out and laugh about the fact that an experiment didn't work. This is what we did [wrong], and we're trying this tomorrow," Buettner said. "Then other people will say 'Have you checked this? Have you thought about that?'"

“That community vibe is really what it’s all about,” he stressed.

This thriving esprit de corps is driven by the underlying fact that JIFX has little to do with the acquisition of product, and everything to do with finding solutions ... finding what works, and what doesn’t work, in meeting the needs of the DOD.

In an era in which the U.S. military is attempting to adjust course to meet the challenges presented by the emergence of peer competitors, finding creative and innovative ways to connect military and industry has become increasingly critical.

While transparency and impartiality in acquisition remain important, a wall between industry and military exists analogous to the pre-9/11 barrier between intelligence and law enforcement, according to Buettner.

“At JIFX, we create an environment that tries to poke holes in that wall so that industry is aware of the government challenges and the people on the government side who make requirements are aware of industry’s capabilities,” Buettner explained. “We have to find a way to get through that wall to stay more agile and connected to industry.”

Since 2002, JIFX and its predecessor programs have excelled at doing precisely that, and continue to find new ways to do so.

This summer’s iteration saw the inclusion of NPS students not directly participating in any of the experiments. For U.S. Marine Corps Capt. Christine Dullnig, pursuing dual masters at NPS in Information Warfare and Space Systems Operations, observing the experiments at JIFX provided an invaluable experience that could not be gained from a textbook.

“We were able to look at different innovations and see how far along their readiness levels are, and how well their systems are integrated with different software and functional areas,” she noted. “This will allow us to stay abreast of the technology that we’re going to see in the Fleet.”

Industry and academic representatives at JIFX also gained from interacting with NPS students, who bring a wealth of experience to the table. The experimentation in autonomous curiosity conducted by Carnegie Mellon University (CMU), for example, is a prime example of the interactions JIFX makes possible.

Machine learning and object recognition have become the technological cause du jour, but CMU is taking this to the next level by having a UAS swiftly teach itself to navigate and search for a target through dynamic and complex environments.

Real-time autonomous curiosity allows a system to learn to adapt to

its surroundings in the same way as a four-year-old at a zoo knows to look around an obstacle in response to ‘that’s a lion over there!’, explained Dr. Bob Iannucci, CMU distinguished service professor in electrical and computer engineering.

“Imagine a warfighter in an emergency rescue situation. You don’t know specifically what you’re looking for until you get there: someone who is trapped, someone in the woods or in a particular car that you need to follow,” he said. “We’re trying to train a drone to have that same sort of intuitive sense of how to recognize a visual target.”

Five hundred meters away from Iannucci’s improvised command post in Camp Robert’s Combined Arms Collective Training Facility, the tail of a notionally-downed helicopter juts out a massive pile of rubble.

With just one click, his team’s UAS speeds off through the sprawling urban training complex to seek out and recognize the target.

“The drone, when it takes off, understands colors, shapes, textures and the basic stuff that makes up computer vision, but it doesn’t know that particular helicopter,” Iannucci said. “So what the drone will do is try to keep that image in view, and as it moves, it’s able to keep tracking

the parts of the image that we said were interesting and get a better sense of this three-dimensional object as being distinct from the background.”

Dr. Ray Buettner  
Professor, Information Sciences  
Director, Joint Interagency Field Experimentation

The JIFX environment affords Iannucci and his team the freedom to pursue this in a way

that is not possible at the CMU campus, both in terms of airspace and radio frequencies availability. Moreover, their experimentation transcends what is possible in a purely academic environment or computer simulation, he said.

“NPS has done an absolutely fantastic job in setting up and running these events,” Iannucci said. “We’ve been to 12 now, and we keep coming back because it’s so beneficial; we can’t get this kind of value any other way.”

“Selfishly, I like it for that reason,” he continued. “But more than that, it’s the community that NPS has created among experimenters that include government, academia and companies all coming together in a way that is not about commercializing products, but about the bounds and limits of technology.” ■■





From communication to innovation, leadership development to strategic alignment, the Naval Postgraduate School Center for Executive Education's lineup has evolved into a broad portfolio of executive development programs tailored to meet the unique needs of the U.S. Navy and Department of Defense.

## NPS' Center for Executive Education Programs Target Broad Navy Leadership

By Matthew Schehl

"Top Gun" is due for an upgrade. And no, it's not the upcoming sequel to the classic 1986 film.

The ranges at Naval Air Station Fallon (NASF) in rural western Nevada have not seen a significant modernization in more than 20 years. Since then, the exponential evolution of aircraft and long-range weapons technologies have made Fallon Range Training Complex (FRTC) too small for pilots to realistically train for combat.

Realizing this, in 2016 the Navy proposed expanding FRTC to meet the evolved training requirements, adding an additional 945 square miles of public land and 102 square miles of non-federal land would be withdrawn for military use.

"This is an absolutely enormous modernization, a once in a generation expansion which is critically important for naval aviation," said Alex Stone, a Pacific Fleet environmental planner who conducted an Environmental Impact Study for the project.

But FRTC's modernization program is under the gun: the permits for its current ranges – in use for 77 years – will expire in 2021, and the modernization plan needs to be implemented before then. Doing so, however, would potentially impact a broad range of actors: ranchers, miners, hunters, 17 different tribes, off-road recreation enthusiasts, as well as a host of federal, state and local agencies.

"We're withdrawing an additional 750,000 acres, so even though it's a rural area, that withdrawn land is going to take from the public a lot of areas for which there are currently other uses," Stone explained. "What makes this such a challenging, complex problem is the number of stakeholders involved, because the withdrawn land affects so many different groups and each of these groups has a unique set of concerns and issues."

Stone's team has leaned into this challenge. They've brought in a range of experts, including anthropologists, biologists, and geologists, and held a series of open meetings with the Bureau of Land

Management to keep the public informed and engaged in the process. Yet they want and need to do more ... And do it better.

“The success or failure of this project is really going to be tied to how well we can communicate with these different stakeholders,” Stone said. And that’s what brought the Top Gun team to the Naval Post-graduate School (NPS).

In early August, Stone and 22 colleagues traveled to the university to refine their team’s strategic communication capability. Along with dozens of key members from multiple commands throughout the Navy, they took part in the school’s intense, three-day Strategic Communications Workshop (SCW).

The SCW is just one of a wide range of programs offered by NPS’ Center for Executive Education (CEE), all making a critical impact on the way Navy leaders tackle the challenges they face.

Over the last decade, CEE has provided hundreds of customized courses, workshops and seminars to hone strategic thinking, enhance decision making and effective communication, promote innovation and manage risk for senior leadership across the services.

“We’ve learned a lot over this time,” said CEE director Winli McAnally. “Our faculty has really fine-tuned their abilities to capture this huge area of knowledge and make it relevant and directly applicable to leadership.”

CEE is a major component of the larger Navy Executive Development Program (NEDP), the service’s initiative to expand the strategic awareness and executive skills of its senior leaders, ranging from high-potential O-5s, O-6s, GS-15s, Senior Executive Service and flag officers up to the four-star level.

Most recently, CEE initiated its newest offering in January, the Command + Strategically Aligned Leadership Team (CSALT) program, an intense two-day workshop for flag officers and their command groups as they prepare to assume a new command. CSALT isn’t new, rather, it’s an evolution of 200 Tailored Support Courses (TSC) that CEE has been offering since 2010.

TSCs focus on helping individual flag officers transition to a new command or senior staff position through developing leadership strategies and techniques customized to that specific command, thus smoothing the on-boarding process.

“We would focus on the particular leader, understand where they’ve been and where they’re going to be and tailor the topics to focus on applying it to their next assignment,” McAnally said. “What we’ve found is that’s a great foundation, but it takes time to synchronize with the new command team.”

CSALTs address this by dramatically reducing this learning curve so that commanders can mesh with their new teams and can hit the ground running – together – from day one.

The genesis of CEE dates back to the early 2000s when Adm. Vern Clark became Chief of Naval Operations. Upon assuming his new duties at the Pentagon, Clark noticed a significant gap in strategic thinking among the flag officers who worked for him. He resolved to find out why and commissioned a study which determined that, while the military invested significant initial education in young officers, it wasn’t sustaining this as they progressed in their careers and their responsibilities grew.

“They knew how to fight wars, how to take care of airplanes and keep the ships up and running, but they didn’t know how to think big picture,” explained Bob Huddleston, who manages CEE’s Navy Senior Leader Seminar (NSLS) program, a week-long workshop to impart the latest “best practices” in planning, communication, negotiations, effects-based thinking, and risk management.

“Adm. Clark saw that our guys were too busy doing, and not enough time thinking; he wanted them to become strategic thinkers at that level,” Huddleston said.

*“We’ve learned a lot over time ... our faculty has really fine-tuned their abilities to capture this huge area of knowledge and make it relevant and directly applicable to leadership..”*

Winli McAnally  
Director, NPS Center for Executive Education

Clark initiated what evolved into the NEDP, and NPS became a major hub for senior leader development through CEE. The organization has since embraced this role and, in addition to the SCW, CSALT, TSC and NSLS programs, the center offers a host of other workshops designed to enable Navy leadership to reach new levels in pursuing innovation through the Leading Innovation course, and strategic planning/risk assessment through its Strategic Planning for Execution: Risk and Assessment program.

And the center is constantly looking for new ways to augment its programs to meet the needs of the Navy and U.S. Armed Forces leadership.

“I’m really excited about this evolution,” McAnally said. “We are positioned to move onto the next level, to be able to take whole organizations and move them forward.” **IR**





Students and faculty attend one of several command representative briefs during the NPS Defense Analysis department's Research Week event in late August. The event provides an opportunity for a stronger connection between the needs of the operational force, and the research of DA students and faculty.

## Defense Analysis Connects Student Research to SOF Needs

By MC2 Patrick Dionne

The Naval Postgraduate School's (NPS) Defense Analysis (DA) department hosted representatives from various Special Operations Forces (SOF) operational commands for a showcase of student research, Aug. 21-23. The event's goal is to help the operational SOF community leverage the research capabilities of the department's students and faculty.

"Bringing representatives from operational and institutional commands together in person with students and faculty members to interact is very important to keep our force informed of ongoing research," said U.S. Army Col. Michael Richardson, NPS SOF Chair.

"On the other side, we have the operational side of the force talking to the school and bringing both near-term and long-term priorities on chronic issues that they need to solve, keeping NPS aware of the problems out in the fleet and field," he continued.

Now in its third iteration, the DA department's Research Week included representatives from eight separate organizations, each presenting their respective, unique research areas of interest and potential challenges to students and faculty across the university.

In execution, the event is three days of meet-and-greets, brown bag presentations and detailed briefings. But the point of the effort is not lost on the attending SOF representatives, and the opportunity to tackle their most challenging problems.

"We are bringing a variety of topics that are important to our command that need to be developed for the future to support the ARSOF [U.S. Army Special Operations Forces] operating concept," said Capabilities Analyst Brooke Tannehill, representing U.S. Army Special Operations Command. "The potential for partnership is great and no matter what both sides are learning something."

DA Research Week also focused on interactions between command representatives and NPS faculty in hopes of developing longer-term, foundational relationships that can be leveraged to investigate today's great challenges, and tomorrow's.

"Commands having a sustained relationship with faculty members will not only help solve problems the commands are trying to solve now, but also, those faculty members bring an incredible wake of students over time to address future problems as well," Richardson said.

Of course, an NPS research showcase would not be complete without a laser focus on the efforts of current students, whose theses are nearing completion or already complete, set to graduate at the end of the Summer quarter in September.

"The main purpose of these presentations is to try and bestow some of the lessons learned to the students earlier in the process of writing their theses, as well as communicate to these command representatives what

we are actually doing here at NPS,” said U.S. Army Maj. Alan Lancaster.

Lancaster, along with U.S. Army Maj. Thang Tran, used their thesis to offer a descriptive overview on Iran’s natural gas industry over the past year, as well as U.S. policy scenarios that would occur under different strategies ranging from a cooperation strategy to a competing strategy.

Since the first DA research week in 2017, department leadership says

the program has evolved, and will continue to, in hopes of fostering the critical thinking skills and specialized knowledge needed for graduates to prevail in today’s, and tomorrow’s, complex conflicts.

“Our institution is very unique,” stressed Richardson. “Unlike a civilian university, the men and women who sign up to teach here and do research here are dedicating most of their adult life to studying these unique areas of security and defense issues. **IR**

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## Marine FASNCOs Bridge Experience With NPS Coursework

By MC2 Tom Tonthat

During a lecture on the history of Turkey, a Naval Postgraduate School (NPS) professor describes an environment of tension and conflict. For U.S. Marine Corps Master Sgt. Bruce Villasenor, it sounded eerily similar to his own experiences while stationed overseas.

Villasenor is a departure from the typical NPS student, but as a Foreign Area Staff Non-Commissioned Officer (FASNCO), he is eligible to take part in a new program that provides senior Marine NCOs with an opportunity to attend a graduate-level certificate program at the university.

The FASNCO program provides Marines with the tools needed to bridge relationships between the United States and its allies abroad by providing language, regional expertise, and cultural (LREC) education opportunities based on the regions they will be deploying to.

“The program allows us two quarters to take as many courses as we can to complete a certificate depending on which region we’re assigned after completion,” said Villasenor.

He was selected to undergo FASNCO training for the sub-Saharan Africa region because of his familiarity with the culture, as he had served there before. He spent a few months in Senegal to immerse himself in the French language before becoming a student at NPS to study the history and culture of the region he would be responsible for.

“When a professor is talking about topics such as Africa’s interactions between the population and government, challenges with education, and extreme poverty from neglected or mismanaged funds, I feel that I’m able to get a deeper understanding and appreciation because I’ve been there and saw this firsthand,” said Villasenor.

Before he was aware of the FASNCO program, Villasenor already had experience working with allies of the United States. He helped bridge the gap between the Turkmen and American communities in Ashgabat, Turkmenistan, by organizing and running events through the support of the local government.

“These types of events were never offered to the local community before,” said Villasenor. “It was during this tour when I realized that direct engagement with other cultures through a common language is the most effective form of communication.”

Upon hearing about the FASNCO program in 2014, Villasenor directed his career to qualify for the program. His efforts worked, and he soon found himself studying concepts of counter insurgency operations with fellow FASNCO student Gunnery Sgt. Ivan Alfonzo at the university’s campus in Monterey.

“The opportunity to use my multicultural background in a Marine Corps job interested me in the FASNCO Program,” said Alfonzo, who credits working with the Marine Corps Embassy Security Group for providing most of the qualifications that he needed for the program.

“I was able to gain a lot of LREC experience and daily interaction with interagency officials and foreign nationals,” said Alfonzo. “In addition, I received language training and made the most out of learning and immersing myself into each culture.”

Alfonso said that effective social dynamics and demonstrating an understanding of the region’s culture is critical to building a rapport with allies. To hone his skills to be an effective FASNCO in the Latin America region, his courses at NPS include the history of Latin America, and politics in Mexico.

“The knowledge and history of the region is key for becoming an effective FAS Marine,” said Alfonzo. “Everything that we learn in our specific region curriculum at NPS definitely enhances our expertise and capacity to operate in other regions.” **IR**



U.S. Marine Corps Master Sgt. Bruce Villasenor, left, and Gunnery Sgt. Ivan Alfonzo are taking advantage of a new program for Foreign Area Staff Non-Commissioned Officers that provides a graduate certificate program based on the regions they will soon operate in.

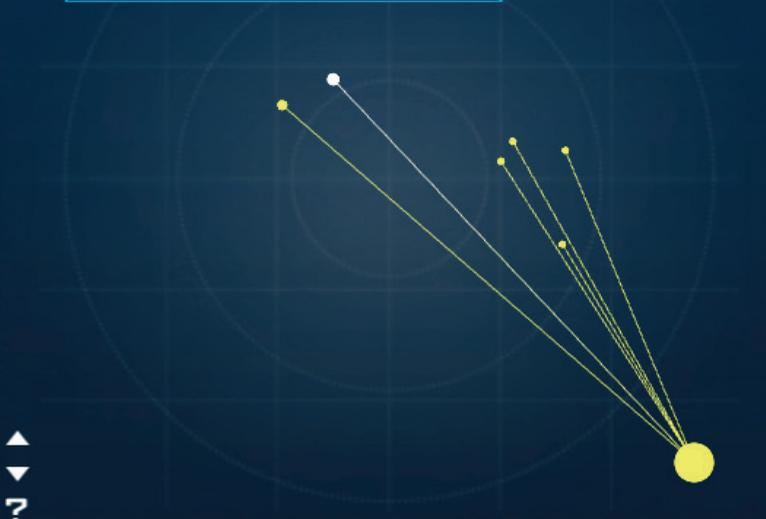
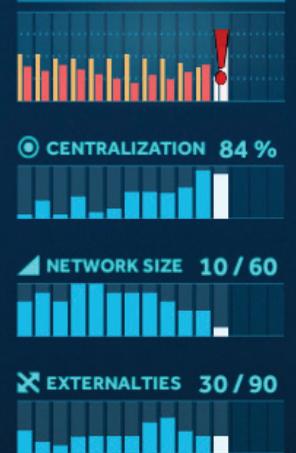
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**ACTIONS** GLOBAL LOGIST OPERAT FINANC EXTERNAL

ACTION	Value
DISRUPT MATERIEL	0
INVESTIGATE NETWORK COMMUNITY	30
	0

**EVENT LOG**  
 TURN ACTIONS
 

1.1	Major Terror Attack
	Disrupt Logistics
	Counter Finance
	Network Shrunk
	Prune Kill
	Decreased Popular Support
1.0	Illicit Fundraising
	Minor Terror Attack
	Disrupt Logistics
	Counter Finance
	Intel Ops on Known Network
	Decreased Popular Support


**TERROR/SUPPORT**

**SECURITY/EFFECTIVENESS**


The state actor modifies its network to maximize detection of attacks in this screenshot of NPS Global ECCO's Dark Networks game, one of several Serious Games developed at the university that have been recognized for their ability to re-enforce complex concepts from the classroom.

# NPS Researchers Recognized for Serious Advancements in Serious Gaming

By Matthew Schehl

Beneath the starry night, you look down upon a residential compound in the suburbs of Abbottabad, Pakistan, wherein dwells the militant Islamist responsible for a series of horrific terrorist attacks around the world. He is your target.

With a pinch of your fingers, and a turn of your head, your gaze shifts in towards the ground. At your direction, two four-man teams slide stealthily towards the compound with surprising speed, awaiting your next command. They breach the wall, surprise the adversary, and with a computer-generated ping, eliminate the sentries positioned along the narrow passageway.

But then, the guards you didn't know were there open fire. Half your teammates immediately go down, and the other half become embroiled in a bitter firefight. If only you had devoted a bit more effort into intelligence collection ahead of time ...

But that's the point.

The notional scenario is actually a game entitled SpecOps. It's a virtual reality experience designed to demonstrate, first-hand, the principles retired Adm. Bill McRaven elucidated in his seminal 1995 book "Spec Ops: Case Studies in Special Operations Warfare Theory and Practice." Based on his 1993 612-page thesis at the Naval Postgraduate School (NPS), the book has become a lodestar for the special operations community in practicing their craft.

"The idea was to gamify some of these principles," said Dr. Michael Freeman, NPS associate professor in the Defense Analysis (DA) department and lead for the Global Education Community Collaboration Online (ECCO), the program developing the game.

Working with Michael Guerrero at NPS' Modeling, Virtual Environments and Simulation (MOVES) Institute, Freeman and his team faithfully recreated Osama bin Laden's infamous, three-story compound in an immersive 3D environment for SpecOps.

The game begins, however, with a series of choices based on what

McRaven called principles of relative superiority ... essentially, the qualities of a successful special operations raid. Players make a limited number of investments in surprise, speed, training, simplicity and intelligence – and with multiple play-throughs, can tangibly experience the trade-offs between the choices they make in their quest to obtain relative superiority.

“It’s great if you can go in with a lot of surprise, a lot of speed and all the training you need, but what happens if you don’t?” Freeman explained. “How does the mission play out differently if you have a lot of intel and you know where everybody is, but you have no surprise, or vice versa?”

Turned into a single-player virtual reality game only last summer, SpecOps is still a work in development, but the computer-based version of the game has already been successfully used to teach McRaven’s principles in the DA department’s History of Special Operations course (DA3880).

Such gaming, however, is not just “beer and pretzels.” Serious games, which academic literature refers to as gamification, are played to stimulate creative thinking, decision making and problem solving. Good gamification allows players to synthesize new knowledge and make critical judgements.

“These games are strategically interactive; there’s no right way to win,” Freeman explained. “You have to understand what your opponent is doing, what you’re trying to do, and how your opponent is going to react. Peoples’ minds are literally more engaged.

“At NPS, we could just put a lecturer or professor up on a stage and talk, but even if it’s something new and innovative, it’s just not as effective,” he said. “But if there’s something that’s better pedagogically for the students, we should always be pushing the envelope in trying to provide the best education we can ... Games are not going to replace a lecture, but they are going to make it that much more powerful.”

Global ECCO’s game Dark Networks is another example of a serious game successfully being used to augment an NPS curriculum.

Two players, red vs. blue, an insurgency and a nation state, vie to establish or destruct a terrorist network. Over the course of 15 simultaneous turns, each player conducts a range of potential actions which either further their goal or counter their opponent’s.

The terrorist player elects to grow or shrink, centralize or decentralizes its organization, perpetrate attacks, garner public support, or gather necessary resources. The state, with minimal initial visibility over the enemy network, must choose between denial of resources and public support, killing or capturing key targets, or increasing its security presence to mitigate the effect of terrorist attacks.

“The state has to make decisions about how much or how to act under uncertainty,” Freeman explained. “For the terrorist, there’s a trade-off between the effectiveness and the security of the network: the things it can do to be more effective and win the game are also the things which will make it less secure and more vulnerable.”

“Dark Networks plays with this balance,” he continued. “There’s no right place for the network to be in terms of its structure; it all depends on

what the player is trying to do.”

In the end, if the state is sufficiently able to disrupt the opponent’s network, it wins; if it fails to do so, the terrorists win. Either way, both players walk away with a deeper understanding of the key concepts of social network analysis (SNA): nodes and links, and the importance of size, centrality and external ties.

SNA is a methodology used by analysts to explore social relationships between individuals and groups, and visually represent them to make complex data sets more readily discernable. It’s also the subject taught by NPS DA professor Sean Everton, upon whose book, “Understanding Dark Networks: A Strategic Framework for the Use of Social Network Analysis,” the game is based.

“A few years ago, [Everton] and I were talking about presentations he had the students give at the end of class where they had to devise a strategy for defeating a given network,” Freeman recalled. “That’s great, but what then? That’s the top of the first inning, the first offensive drive for a football team; how will that strategy play out once the enemy adapts to your strategy?”

Freeman and Everton then brought the idea to the University of Southern California’s Institute for Creative Technologies (ICT), and the Dark Networks game was born. Since then, it’s been employed as a learning tool through several SNA courses and at other DOD schoolhouses.

“Dark Networks breaks up the class and provides students with a change of pace from learning the details of SNA,” Everton said. “More importantly, it helps reinforce important concepts that we cover in the class. It is so easy to get hung up on mechanics when learning a quantitative approach for analyzing dark networks ... This game offers students to focus more on the concepts and what these might mean for disrupting dark networks.”

The game’s success reaches beyond the NPS classroom too. This past Spring, NPS submitted Dark Networks to the 2018 International Serious Play Competition held by George Mason University’s Virginia Serious Game Institute (VSGI), a program dedicated to the promotion of game-based learning throughout the nation.

When the results were announced, Dark Networks was awarded a silver medal.

“This shows that we’re doing something pretty innovative at NPS,” Freeman said. “A lot of people don’t really understand these types of games, equating them to playing casual games like Battleship or chess, but serious games are a huge deal.”

“I think it shows that NPS is always trying to improve and innovate in how we educate our students,” he added. ■



DARK  
NETWORKS



Commencement speaker Vice Adm. P. Gardner Howe III, right, is presented with the Distinguished Alumni Award from NPS President retired Vice Adm. Ronald A. Route following Howe's inspirational address during Summer Quarter Graduation, Sept. 21. Howe shared a powerful, personal story about his own experiences as an NPS student during his memorable commencement address.

## Alumnus Shares Powerful Story of Transformation With Summer Grads

By MC2 Nathan K. Serpico

The Naval Postgraduate School (NPS) bid farewell to 320 graduates, including 29 international students from 11 nations, earning 323 advanced degrees during the 2018 Summer Quarter Graduation ceremony in King Auditorium, September 21.

University president retired Vice Adm. Ronald A. Route opened the ceremony with a congratulatory message to the quarter's graduating class, and then turned the podium over to commencement speaker Vice Adm. P. Gardner Howe III, currently serving as Associate Director for Military Affairs at the Central Intelligence Agency.

"I'm so glad to be back here at the Naval Postgraduate School," opened Howe. "NPS is such a special place, but not because of the incredible, natural beauty of the Central California coast or Monterey Bay.

"It's special because of what happens here, or at least what happened to me here," he continued. "It was an intellectual awakening, and a transformational experience, for my personal and professional development."

Howe graduated from NPS in 1995, earning a Master of Arts in National Security Affairs. He arrived at NPS in the middle of a promising military career after graduating from the Naval Academy with 10 years of active duty service under his belt. He had already earned his trident by completing BUD/S training and initial SEAL qualifications training, in addition to five arduous deployments behind him.

He was quick to admit that he stepped foot on campus as a man with confidence, that he knew what to expect. But it didn't take long to realize he was wrong.

"It only took about halfway through my first [quarter] of studies here for me to realize how naïve and under-developed intellectually that I was," Howe recalled.

"With all that experience, I felt that I had a pretty good idea of how

the military and world worked," he continued. "But it was here that I began to appreciate the complexity that is inherent in the world. And I began to appreciate the rich tradition of academic thought developed in schools and universities over millennia to deal with that complexity."

During his studies, he said, Howe developed new ways of thinking and seeing the world, sharpened his critical thinking skills, and improved his communication abilities.

"Most importantly, I developed a thirst for constant learning that continues to this day," Howe declared. "My experience at the Naval Postgraduate School gave me an intellectual foundation that has served me incredibly well in the years since then."

Howe then shifted his address from his time at NPS to a broader perspective on current U.S. security. After almost two decades of counterterrorism operations against non-state actors, the U.S. national defense strategy has reoriented the DOD against powerful state competitors such as China and Russia, coined Great Power Competition, Howe noted.

Significant investments in advanced technology and weapons have made these nations powerful peers, with comparable technology in military platforms, equipment and capabilities, he added.

"I'd offer that there is really only one place for us to look for a competitive military advantage," Howe noted. "And I believe that advantage is you, the leaders of our military force. It's not going to be our technology, or our tactical competence that is going to provide a decisive advantage over a peer competitor in a future conflict.

"Technology and tactical competence are critical components, but they won't be sufficient to prevail over a peer competitor," he continued. "In my view, it all comes down to education ... Advanced education, like what is accomplished here at NPS, serves as the key enabler for our nation's competitive military advantage." **IR**

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# A New Voice

Military officers across the U.S. Armed Forces place a priority on service to others — it's an innate value, deeply-rooted in the culture of military service.

For Capt. Zachary Daniels, a rare Air Force meteorology student at NPS, an opportunity for service materialized during his countless hours in

one of the university's atmospheric labs in Root Hall. There, he regularly ran into Juan Olguin, a member of the Hope Services team that provides janitorial services to the institution.

Olguin is a well-known fixture on campus who typically has a lot he wants to say, but it's not always easy for those around him to understand. Daniels wanted to understand ... and he wanted to help Olguin share the thoughts he was so eager to communicate.

The solution to providing a new voice for Juan came to Daniels while he was in the RoboDojo, a lab where students are encouraged to think outside the box and explore tech that interests them without an assigned end always in sight.

"I envisioned a harness and a tablet device that could translate text to a computer voice. I researched off-the-shelf products that only needed some minor customization and developed a wearable iPad that is loaded with a text to speech app called Predictable that was specifically designed for the special needs community," explained Daniels.

Hope Services managers, seasoned veterans at communicating with Juan, pitched the idea to Olguin himself, and he loved it. Daniels turned to the Internet, starting a GoFundMe campaign entitled "Help Juan Speak." A handful of weeks later, Daniels presented the new communications device to Olguin outside the lab where they first met.

"I'm very thankful to Capt. Daniels for this great gift, I love it!" Olguin said with the help of a sign language interpreter.

"I was really moved to see how much Juan appreciated this," Daniels said proudly. "To see all of the love and support of everyone around Juan translated into a tangible item that he can physically hold is immensely gratifying ... Juan seemed equally as moved to know how much we all care about him, and that is what made this project worthwhile.

"I like to take the approach that if something needs to be done, I might as well step up and do it rather than wait for the next person to take the initiative," continued Daniels. "Sometimes, it just takes a little extra push to put our innate humanity to work."

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