INSIDE:
A Warrior’s Legacy – McChrystal Shares His Story During Unique SGL
Deputy Secretary of Defense Visits NPS, Honors Spring Graduates
Intern Develops Small, Inexpensive Star Tracker

SUCCESS
NPS’ TEAM ARSENGL FLIES ITS 50 UAV SWARM!

IN REVIEW
NAVAL POSTGRADUATE SCHOOL
MAGAZINE
November 2015
PRESIDENT’S MESSAGE

Welcome to our return to “In Review,” the Naval Postgraduate School’s flagship magazine. Following a brief hiatus in production, we are excited to present our most recent work in our mission to provide truly exceptional graduate education experiences, and place a spotlight on the outstanding work our students, faculty and staff do every day.

This mission sets us apart, for there is no other institution in the world that mirrors NPS’ dedication to relevant student research. While we boast academic programs with a rigor and quality that rival the nation’s most prestigious institutions, NPS studies are firmly grounded in the operational forces. Even among top defense research establishments, NPS is unique in its broad portfolio of academic programs, from national security studies to business, applied sciences to information science.

This issue of “In Review” features several examples of just what makes NPS the one-of-a-kind institution that it is. Our Defense Resources Management Institute (DRMI), part of the Graduate School of Business and Public Policy, celebrates 50 years of advanced education this year. DRMI provides U.S. and international officers with highly esteemed, unique instruction in defense resource management and analytical decision-making.

In this edition, we focus on the continuing partnership between the Naval Postgraduate School and the U.S. Marine Corps Expeditionary Energy Office (E2O). The Marine Corps has been on the front lines of the fight to strengthen our capabilities by diversifying our energy sources. Some time ago, E2O leaders engaged with NPS and we have become a true enabling partner in the success of their mission, providing expert graduates to the E2O team, and an array of the most recent research dedicated to supporting their efforts.

We also highlight the establishment of our new Surface Warfare Chair, an effort spearheaded by Commander, Naval Surface Forces Vice Adm. Thomas S. Rowden. The SWO Chair will serve as a direct link between NPS research and the Surface Warfighting Development Center. He will also be an on-campus mentor to our many SWO students, and will be representing NPS to the SWO community in the fleet. Our SWO Chair will serve as an outstanding resource in ensuring our programs remain grounded in the needs of our warfighters.

Like many universities, the value of NPS is reflected in the accomplishments of our graduates, and our alumni are making a difference at all levels of the defense spectrum. Deputy Defense Secretary Bob Work is one such alumnus, and he returned to campus this past summer to engage with NPS on a number of initiatives. Retired Vice Adm. Michael Vitale, a respected leader in innovation, also revisited Monterey to share his views on this critical subject.

Col. Giorgi Jachvadze, who applied his NPS master’s degree in personnel management to his role as a key leader of reform for the Georgia Ministry of Defense, is an example of a NPS graduate who engaged in Georgian Ministry of Defense reforms. He will also be an on-campus mentor to our many SWO students, and will be representing NPS at the South West Office (SWO) Chair.

Finally, a team of faculty, students and research staff in the university’s Advanced Robotic Systems Engineering Laboratory (ARSENL) recently set a world record – launching and flying autonomously a swarm of 50 unmanned aerial vehicles all at the same time. The effort opens the doors to a broad spectrum of research into the advanced studies of large swarms of small, capable UAVs.

Like countless other programs at NPS, this impressive research will provide a foundation for many students in the quarters to come, while providing senior Navy/DOD leaders with an innovative approach to one of national security’s current challenges.

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

“While we boast academic programs with a rigor and quality that rival the nation’s most prestigious institutions, NPS studies are firmly grounded in the operational forces.”

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On The Cover
NPS Advanced Robotic Systems Engineering Laboratory (ARSENL) recently set a world record – launching and flying autonomously a swarm of 50 unmanned aerial vehicles all at the same time.

For more information about NPS, visit the new NPS NewsCenter at www.nps.edu/news. For free subscription information or to submit your comments or ideas for future issues of In Review magazine, contact dmkuska@nps.edu.
New Chief of Staff Takes the Helm

NPS welcomed incoming Chief of Staff Capt. Anthony Parisi to the university, July 17. And while Parisi is new to the chief of staff position, he is not new to NPS, graduating from the university’s Department of National Security Affairs in the 90s.

“I have to admit that when I was here as a student, there wasn’t this wonderful place in the world,” said Parisi. “I had just come out of four and a half years of arduous sea duty and they told me that my job here was to learn, just to learn.”

The son of a first-generation Sicilian fisherman from the hamlet of Glasgow, Missouri, Parisi grew up by and around the sea. “I basically grew up on a fishing boat, and I liked it,” said Parisi.

Throughout his naval career, Parisi has spent a lot of time at sea. “Throughout his naval career, Parisi has spent a lot of time at sea.”

Capt. Anthony Parisi officially took the helm as NPS' Chief of Staff, July 17.

I can say that I directly used my NPS education and put it to practical use in the field,” said Parisi.

MORS Tisdale Competition Recognizes Outstanding Thesis

The Military Operations Research Society (MORS) Stephen A. Tisdale Graduate Research Award competition was held in Glasgow Hall, Aug. 27, recognizing the student whose thesis offers the most immediate or near-term value to the U.S. or its allies.

Professor of Practice Wayne McLemore. “Fuel costs for ECU generators resulting in fuel cost savings of several hundred million dollars per year to the DOD.”

MORS Tisdale award is one of our most prestigious awards for thesis accomplish-

ments and student participation in operations research.”

James B. “Brent” Logan, a professor in the Army’s attack helicopter fleet, was just one of several Defense Energy Seminar attendees.

One of the selectees for this year’s SSG is Lt. Andres Otero, studying in the USMC Engineer and Expeditionary Power Management, or Army DACM Policy. The Office of the Army Surgeon General, because the logistics is far more vulnerable to interdictions and threats than the actual operating forces.”

Boyd’s team is charged with researching ways to change the culture of consumption by conserving fossil fuels and necessary consumables.

We have to change our ethos of believing it’s an inexhaustible asset,” said Boyd. “We have to understand that the movement of fuel is something we need to prevent. We have to be efficient in terms of our acquisition of equipment and equipment items so they are far more efficient than their predecessors.”

Apache Engineer Takes Top DOD Student Award for Summer 2015

Lt. Cmdr. John Sprague receives the MORS Tisdale Award, Sept. 15.

“A lot of the money on fuel for generators that power environmental control units [ECU],” said McLemore. “Fuel costs for ECU generators in Iraq alone cost well over $1 billion dollars per year. Lt. Cmdr. Sprague’s thesis described a way to centrally manage such generators resulting in fuel cost savings of several hundred million dollars per year to the DOD.”

School of Business and Public Policy. The Office of the Army Director for Acquisition Career Management, or Army DACM Office, located within the U.S. Army Acquisition Support Center, sponsored his studies.

Logan, who works with the Apache, the backbone of the Army’s attack helicopter fleet, collaborated with a three-person team to write the thesis that impressed the award committee:

“Apache production and fielding engineer with the Army’s attack helicopter fleet, was just one of several Defense Energy Seminar attendees.”

Apache Engineer Takes Top DOD Student Award for Summer 2015

James B. “Brent” Logan, a production engineer with the Army’s Apache production and fielding group, received the Outstanding Academic Achievement Award for DOD Students for the 2015 summer term.

Logan completed his studies for a master in program management (MSPM) in NPS Graduate and North Red Seas. He also participated in several shorter deployments to Northern Europe, the Eastern Pacific, Arabian Gulf and South America. But he is perhaps most proud of the time he spent commanding Afloat Training Group Mayport, the USS The Sullivans (DDG 68) and the USS Zaphyr (PC 8).

“Parisi relished his time at sea, but it was his numerous trips ashore as a ‘quasi-diplomat’ that inspired him to pursue an interest that coincided directly with his NPS education in national security affairs.”

“I decided to go into the defense attack business, which brought me to Rome, Italy where I was the senior defense official and naval attaché for three years. It was an incredibly eye-opening job where I can say that I directly used my NPS education and put it to practical use in the field,” said Parisi.

group of experts to discuss, and at time debate, ISIS information operations (IO) and networks as well as U.S. interests in the region and Western policy options.

Baker contributed with a discussion on the success of ISIS IO campaigns in spite of the air campaign against ISIS militants. He explained that the current air campaign targeting bombing alone cannot defeat the militant organization.

“The terrorist acts of the 90s and 2000s were a product of Iraqi jihadists being raised under extremest ideology. If we continue to allow this generation of young

and I liked it,” said Parisi.

Throughout his naval career, Parisi has spent a lot of time at sea. He is new to the chief of staff position, he is not new to NPS, graduating from the university’s Department of National Security Affairs in the 90s.

“I have to admit that when I was here as a student, there wasn’t this wonderful place in the world,” said Parisi. “I had just come out of four and a half years of arduous sea duty and they told me that my job here was to learn, just to learn.”

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Naval postgraduate school

Education and collaboration are important components to keeping the border secure. Chief of the U.S. Border Patrol (CBP) Michael J. Fisher told students in NPS’ Center for Homeland Defense and Security (CHDS) Executive Leaders Program (ELP), Aug. 12. During his 90-minute presentation, Fisher discussed the challenges facing the agency as well as its risk-based approach to border security. The agency employs technology and collaboration in its mission to guard the nation’s boundaries. “The Border Patrol and DHS [Department of Homeland Security] do not have the market cornered for getting us to a secure border,” Fisher said prior to his presentation. “We are heavily dependent on a whole of government approach. We are really dependent on our law enforcement, our state and tribal partners. It’s not taking a back seat and saying ‘when are you guys going to fix this?’ The environment is too complex for one component within one agency within one department to take on.”

Speaking at educational programs offers Fisher an opportunity to communicate CBP’s mission and approach while also learning from the students and professors comprising the ELP student composition. “I think the academic community is in a good position to contribute because they are inquisitive by nature and are creative in thinking about the challenges we face,” he said. “I learn a lot from these kinds of discussions.”

CCMR Helps Mediterranea n Partners Address Crisis in Illegal Migration

Maritime security experts from some 19 littoral and associated Mediterranean nations, international and regional law enforcement and security organizations, U.S. Combatant Commands and think tanks recently gathered in Athens, Greece to address the growing crisis created by illegal human migration through the Mediterranean Sea.

“Has what been going on in Europe since 2014 is not only an unprecedented surge in the number of illegal migrants and asylum seekers,” says-retired Italian Rear Admiral Alberte Cervone. “Migrants have died in their attempt to cross the Mediterranean, in numbers never before, and the European Union has been held responsible for their fate.”

Between January and April of 2015, some 1,650 fatalities were reported in the Mediterranean. People are really desperate. They’re willing to take the risk,” added retired Navy Capt. and Lecturer Timothy Dooley with NPS’ Center for Civil Military Relations (CCMR).

According to Frontières (France), a European Union (EU) agency that facilitates cooperation between national border guards throughout the EU, illegal passage by sea through the Mediterranean saw a 300 percent increase in 2015 compared to 2014.

The CCMR-coordinated workshop addressed this problem in conjunction with the Marshall Center and the Hellenic Coast Guard with funding from the Counter Terrorism Fellowship program. U.S. European Command (EUCOM), particularly its Joint Interagency Partnering Directorate, was an important workshop participant. The EUCOM 39 office leads EUMOS’s efforts to integrate agencies, academics, NGOs, and private sector partners with “a Whole of Society” approach to illegal migration and other issues.

“This conference was another important step in our efforts to build interagency consensus among allies and partners for a collaborative approach to addressing maritime transnational threats in the Mediterranean,” said Rear Admiral Jeff Buettner, EU commander.

Ensign Eric Bermudez echoed this sentiment, noting he looks forward to expanding his knowledge in cutting-edge fields, especially unmanned systems design and controls.

“The study of robotics and control systems has always fascinated me, and I’m looking forward to learning the science behind the technology and working with the vast amount of tools here at NPS to further my associate degree and thesis,” said Bermudez. Selected during their junior year at the Naval Academy, Bowman Scholars then attend the academy. Most Bowman Scholars perform an advanced research internship and a select group of 2015 Bowman Scholars. These officers earn special appointments to the Navy’s nuclear power training pipeline through the prestigious Adm. Frank Bowman Scholars Program.

When I was appointed a Bowman Scholar, I was most excited about the expanded opportunities to further the Navy’s goals through research and continued education,” said Ensign Stephen Arceneaux.

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Two of NPS’ Bowman Scholars, Ensigns Stephen Arceneaux, left, and Eric Bermudez.

Asymmetric Warfare Workshop Focused on Asymmetric Warfare

NPS’ Consortium for Robotics and Unmanned Systems Education and Research (CRUSER) held the latest edition of its popular Warfare Innovation Workshop (WIW) in Glasgow Hall, Sept. 21-24. NPS Warfare Innovation Chair Capt. Jeff Hyink discussed how past workshops have inspired student research and contributed to the quality of the NPS experience.

“We have many things that come to NPS in the form of questions, challenges, money and expertise,” said Hyink. “Innovation workshops bring your focus to bare a handful of these inputs.” According to CRUSER Director Dr. Ray Buettner, the IWIF intends to create real-world, real-time changes in the Department of Defense. “You can’t do to what everyone else does in the Navy,” said Buettner. “We are looking for different ideas and we’re trying to create environments where new things happen.”

“Engineers and scientists working for the government created the precursor to the Internet and they got out there and put it in the hands of everyone,” said Bowettner. “We are looking at the same thing.”

As directed by the Secretary of the Navy, CRUSER supports the Navy’s mission through education and research in the fields of unmanned systems and robotics and is funded through the Office of Naval Research.

Professor Aruna Apte Honored With Hamming Award

Graduate School of Business and Public Policy (GSBPP) Associate Professor Aruna Apte has been awarded the 2015 Richard W. Hamming Award for Achievement in Teaching.

“I’m very thrilled to receive this award,” said Apte. “I have received more than 50 e-mails, some of them from my students, congratulating me, which makes me feel very good.”

The Hamming Award recognizes NPS faculty members for outstanding teaching, excellence in thesis supervision, and for the strength of their contributions to the university and their colleagues.

Professor Aruna Apte

NPS Provost Honored With Navy Distinguished Civilian Service Award

University Provost Dr. Douglas A. Hensler received the Navy Distinguished Civilian Service Award during a brief ceremony in Hermann Hall, Sept. 28. Hensler retired from the institution to spend more time with his wife Janie and the rest of his family in his home town of Longview, Wash.

“As many of you have noticed I have moved around quite a bit in my career and I wouldn’t be standing here without all the support from my wife, Janie. She has been my rock. This award really is a tribute to her,” said Hensler, with NPS President retired Vice Adm. Ronald A. Atlas also recognizing Janie Hensler with a Certificate of Appreciation.

“Our product at NPS is intellectual capital knowledge. We create a special product for our students and many people want to understand the nature of that product,” continued Hensler. “We need to educate those that don’t understand this, and how valuable our product truly is.”

Hensler’s academic achievements include a BSE in Aerospace and Mechanical Sciences from the University of Portland, and a Ph.D. in Finance from the University of Washington. He is also a licensed professional engineer in Quality Engineering in the State of California. Hensler holds the Naval Postgraduate School Provost position in June 2013.

Continued on page 8

U.S. Border Patrol Chief Michael Fish er speaks at NPS CHDS, Aug. 12.

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Space Systems Academic Group (SSAG) Professor Sam H. Newman officially assumed the position of Acting Provost, Oct. 5. As he steps into his new role on campus, he noted his first order of business is to continue the efforts of former University Provosts Douglas A. Hensler, who retired from the institution in June 2015, and Academic Dean, in particular, to maintain the institution’s high academic standards and accreditation at NPS, Newman said. “There is much the Provost is expected to do, but at the core of this responsibility is supporting the education of our Navy and Marine Corps officers, and their joint service and international colleagues, especially in our current times of fairly stringent fiscal and budget constraints. The Seas.”

Newman has been an enthusiastic teacher and researcher on campus in his role as Professor and Associate Chair of the SSAG especially in the fields of small satellite, micro-satellites, and orbital mechanics. While his new responsibilities of Acting Provost will dominate his time, he does still intend to continue some teaching and research in space systems. “While Acting Provost, I intend to keep up with the Space Systems program here at NPS,” Newman said.

“The recognition of our group illustrates NPS’ value to the Navy, especially with respect to cutting edge technologies like directed energy,” said Blau. “It is important for us to think in these terms in the beginning and then let them carry [the work] forward.”

Distinguished Professor Honors Confirmed at Graduation Ceremony
NPS Department of National Security and Decision Making Professor Dr. David Yost was formerly conferred the title of Distinguished Professor during the university’s Summer Quarter Commencement ceremony in King Auditorium, Sept. 25. Yost was recognized for his scholarly contributions to NPS, the Department of Defense, NATO and academic institutions around the world.

Yost’s PhD students, supervised more than 40 master’s students, and co-supervised many others. “They are the next generation. They are the next generation. They are the next generation.”

“\"I feel profoundly grateful and honored to have been awarded this title,\" said Yost. \"After many years as a professor, my responsibilities remain the same. I teach and conduct research about European politics and security issues.\"

This includes matters of strategic import including military defense, space-based defense, and the organizational structures of allied forces. Yost has found a receptive audience in the students who rely upon him to make sense of organizational matters like NATO and the European Union.

\"NPS students are preparing to work with U.S. allies and partners around the world,\" said Yost. \"They are highly motivated to learn about ongoing and emerging security issues, and about the challenges of working with allies and partners in various types of operations.\"

Since joining NPS in 1979, Yost has served as the lead advisor or co-advisor on 172 master’s theses and received five PhD students, supervised more than 40 master’s students, and co-supervised many others.

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DRMI to stay relevant over this period of incredible change is a remarkable testament," he said.

The Navy Management Systems Center, which eventually became DRMI, was established in 1963 by then Secretary of Defense Robert McNamara. Before he became the leader of DOD, McNamara was the CEO of the Ford Motor Company, and he attempted to apply some of the private sector economic principles that led to his successes at Ford to DOD.

"McNamara installed the Planning, Programming and Budgeting System (PPBS), which is still in use today. It requires good economic analysis; because the main problem in defense economics is the allocation of scarce resources among many competing interests under conditions of uncertainty," explained NPS Professor Emeritus Dr. James Blandin.

Blandin, whose father was one of DRMI’s founders, taught at NPS for 34 years. He notes that McNamara’s push to implement the PPBS system was frustrated by a lack of people qualified to use it. As a result, McNamara directed the founding of a center that could be used to develop people with the skills necessary to realize his vision. The decision to stand-up that center at NPS was driven by recognition of the NPS faculty’s experience in defense-focused graduate education.

Later, during President Lyndon Johnson’s administration, a PPBS system similar to the one used by the DOD was enacted throughout the federal government, and civilians began to join DOD professionals at NPS to receive the education necessary to ensure its success. DRMI rose to McNamara’s challenge and remains true to its core mission.

Like the university itself, however, DRMI has also extended its faculty expertise to our international partners by providing resource management courses to allied defense professionals from around the world. "[DRMI’s] international participation has been invaluable to the U.S. It creates a linkage between the U.S. and other nations, and we have had some illustrious people come through and go on to do some pretty amazing things … Over the years, we have received a tremendous value for the dollar that we spend [at DRMI],” said McCord.

In 1970, NPS offered its first Senior International Defense Management Course, or SIDMC. SIDMCs are comprised of senior defense leaders from around the world who gather to listen to a variety of subject matter experts, NPS faculty, and each other for four weeks at NPS. Students also participate in an exercise designed to test their ability to allocate resources amongst competing interests.

"If we’re successful, the participants will think about their national security,” said Associate Professor Eva Regnier. Assistant Minister for Plans, Policy and Operations Victoria K. Sawyer with the Liberian Ministry of Defense is a SIDMC graduate. "Blanks sorts of international cooperation helps to change minds and creates greater understanding,” said Sawyer. “Strategic planning, value for cost thinking, decision making, and most importantly, accountability and transparency … That is what my country needs most.

SIDMC successes at DRMI led to the creation of the International Defense Management Course (IDMC) in 1971. Like the SIDMC, the IDMC aims to arm students from allied nations with resource management and other fiscal planning tools, but it is geared toward mid-level officers and defense civilians.

When the Soviet Union fell in 1991, demand for DRMI expertise increased further. Former Soviet republics began to turn to the U.S. for assistance as they developed new economic policies within their respective defense ministries and departments.

"Countries that had previously been in the orbit of the Soviet Union became new democratic states. When countries in the Balkans, Poland, Hungary and Slovakia gained independence they looked to the U.S. to help them with their educational programs, and DRMI was called upon,” said Blandin.

And while DRMI has been offering courses to international students from nearly day one, on the heels of its successes among the former Soviet Republics, it increased its mobile course offerings, bringing DRMI and NPS expertise to more than 70 different nations worldwide.

"Teaching abroad is efficient. We can teach 30-40 people for what it would cost to teach only three people attending a resident course at NPS. When teaching overseas, we also benefit from our ability to use local interpreters to overcome language barriers and are able to tailor our courses to issues relevant to our host nation,” said Polley.

As McCord, and other defense leaders spanning five decades, can attest, DRMI has made a lasting contribution to the DOD’s ability to allocate and manage defense resources and has helped to shape the defense departments and ministries of allied nations around the world.
McChrystal has been at the heart of U.S. campaigns and his presence in these last nearly 14 years of conflict, Arquilla continued, Gen. McChrystal has been at the heart of U.S. campaigns and his presence on campus offers an incredible opportunity to NPS students. During the candid, and at times humorous discussion, McChrystal presented a series of snapshots from his past, sharing what Arquilla called his "origin story." The son and grandson of career military men and the oldest of six brothers, who all served in the military, and a sister who married a Soldier, McChrystal’s was the poster family of military families. "I [even] married a girl whose father was a Soldier and her brothers were Soldiers. You get the picture," he quipped.

"This is a really special occasion," said Arquilla. "If this were 70 years ago, it would be like being able to get together with Omar Bradley, George Patton or Dwight Eisenhower." In these last nearly 14 years of conflict, Arquilla continued, Gen. McChrystal has been at the heart of U.S. campaigns and his presence on campus offers an incredible opportunity to NPS students. During the candid, and at times humorous discussion, McChrystal presented a series of snapshots from his past, sharing what Arquilla called his "origin story.”

"The moment you think ‘they just don’t get it,' you are really in trouble,” he said. in A Warrior’s Legacy – McChrystal Shares His Story

By Kenneth A. Stewart

Former Secretary of Defense Robert Gates referred to him as "perhaps the finest leader of men in combat I have ever met." Retired U.S. Army Gen. Stanley A. McChrystal’s military resume speaks for itself. He led a coalition of 45 nations as the commander of U.S. and International Security Assistance Forces (ISAF) in Afghanistan, ran the Joint Special Operations Command, and chased SCUD launchers during the Gulf War, just to name a few high-lights.

Since retiring from the Army, McChrystal has been writing books, teaching leadership at Yale University and calling for greater engagement through the Franklin Project. He sat down with Naval Postgraduate School (NPS) Department of Defense Analysis (DA) Professor Dr. John Arquilla, July 14, in the university’s King Auditorium to share his perspective with students, and to articulate his vision for the future.

"You cannot just empower people to go down and execute unless you empower them with an unprecedented level of information, what we call ‘shared consciousness.’ It’s transparency at a level that gives people a contextual understanding,” said Jason Leyk.

Retired Army Gen. Stanley McChrystal

Former Commander, International Security Assistance Force Afghanistan

"I believe the development and maturity of an officer won’t come with sunbathing thoughts, but with challenging oneself, with thinking of far-reaching operational and tactical matters," Hughes said.

Leyk, a seasoned researcher who came to NPS from the National Archives, is working with NPS Special Collections Manager John Sanders on the Hughes collection and the "NPS Legacies" exhibit. They hope to open the exhibit by early 2016.

NPS Legacies Exhibit in Development at Dudley Knox Library

Naval Postgraduate School Professor of Practice retired Navy Capt. Wayne Hughes donated an extensive collection of his personal journals, research notebooks and correspondences, encompassing six decades of his own development as a naval officer and strategist to the university’s Dudley Knox Library (DKL) for an upcoming exhibit entitled, "NPS Legacies."
CONTROLS

- Peering into the future
- Diagnostic software bug testing

COMMUNICATIONS

- Peer-to-peer networking for distributed swarms
- WiFi-based communications allow planes to broadcast their position and flight status, and receive commands from the ground operator
- Once commanded, planes can coordinate swarm behaviors among themselves
- Communications are designed to function in the face of message loss
- Backup link allows communication directly between ground and individual planes
- R/C receiver allows pilots to take manual control of any plane if it experiences a problem in flight

SENSORS

- Moving toward computer vision for tracking
- Planes are equipped with sensors for position, altitude, speed, and orientation
- Each plane broadcasts its position to other planes to calculate its movement
- One- or two-dot camera on board captures video during flight for later analysis
- Working with researchers in computer vision to automatically detect and follow other planes based on video

SOFTWARE

- Open source ecosystem
- Onboard and ground software built on top of open source software, including Linux, Ardupilot, and Robot Operating System
- Benefit from crowdfunding for finding software bugs and testing new features

SYSTEMS

- Modular software architecture
- Separate software components control flight, handle commands from the operator, and coordinate movements of other planes
- Modular controllers for different swarm behaviors, including follow-the-leader, distributed swarm, and sequenced landing
- Integrated fail-safes ensure that planes remain on designated area and both automatically, if any subsystem fails during flight

POWER SOURCE

- Lithium polymer batteries
  - Energy density and electric power
  - Quickly rechargeable for repeated flights

HARDWARE

- Extremely low-cost UAV platform design
  - Hobby-grade R/C components, including engines, motors, and batteries
  - Modular design that allows easy replacement of components
  - Custom printed circuit board distributes power and minimizes wiring
  - All printed parts can be repeated easily as the design evolves

AUTOMATED MULTI-PLANE PROPULSION SYSTEM (A.M.P.P.)

- Student-driven research, design, and development

SOFTWARE

- Launching software connects to planes and to ground operator
  - Launcher is capable of readingRFID tag on each plane
  - Able to communicate directly with planes and with ground operator for coordinated takeoff

MECHANICAL

- Electric chain-driven launch
  - Plane is placed on launch rail and attached to a motor-driven chain
  - Motor accelerates plane from rest to 35 miles per hour in eight feet
  - Rechargeable launch batteries provide 200 amps during each launch
  - Launcher is driveable, can be framed into favorable winds for takeoff

MISSION CHALLENGES

- Aim to launch and fly 50 planes together in a swarm
- Limited battery life constrains flight time to 45-50 minutes
- Once launched, aircraft will perform two follow-the-leader formations, each consisting of 25 planes
- Swarm must be launched in less than 30 minutes to successfully swarm and land safely

LEADER FOLLOWER BEHAVIOR

- For each follower UAV:
  1. Get current heading of the leader UAV
  2. Compute leader UAV’s expected position in the future
  3. Determine a fixed distance and relative bearing offset from the leader’s future position (e.g., “follow directly behind, 50 meters”)
  4. Specific new commanded position for follower UAV

EQUIPMENT

- 50 aircraft simultaneously
- ARSENL-50 launched and flown autonomously in coordination for UAVs controlled by a single operator
- Aug. 27, setting what is believed to be a world record for simultaneous flight of 50 autonomous unmanned aerial vehicles (UAVs)
- Modulair fail-safes ensure that plane remains on designated area and both automatically, if any subsystem fails during flight

EVOLUTION OF SWARM UAV CAPABILITIES

- 10/2013 – First autonomous flight
- 06/2014 – First 10-plane swarm
- 05/2014 – 2 Zephyrs flown together
- 12/2013 – First time a companion computer (“payload”) and WiFi were integrated onboard the aircraft
- 04/2014 – First autonomous landing of Zephyr II
- 08/2015 – 50 flown together
- 04/2015 – First autonomous launch of Zephyr II
- 07/2015 – 30 flown together
- 04/2015 – 12 flown together
- 02/2015 – Up to 6 flown together
- 11/2014 – Up to 6 flown together

REDEFINING SWARM INTERACTIONS

- Two swarm operators
  1. Manages for missions and forward behaviors
  2. Monitors responsible for swarm health (battery, altitude)

SOFTWARE

- A.M.P.P.: Automated Multi-Plane Propulsion System
- Student-driven research, design, and development

MATERIALS

- 3D printed landing skids
- Custom printed circuit board distributes power and minimizes wiring
- Small, single board computer runs autonomy software on a processor
- Hobby-grade R/C components, including servos, motor, and batteries

HARDWARE

- Electric chain-driven launch
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LITHIUM POLYMER BATTERIES

- Quick rechargeable for repeated flights

LUMINARIES

- Student-driven research, design, and development

AUTOMATED MULTI-PLANE PROPULSION SYSTEM (A.M.P.P.)

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SWARM PHASES OF OPERATION

- Climbout
- Ingress
- Swarm mission
- Egress
- Landing

EQUIPMENT

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Naval Postgraduate School - Naval Postgraduate School

**Naval Postgraduate School**

**NPS, Marine Corps Partnership Enhances Readiness Through Education**

By Kenneth A. Stewart

In 2009, then Commandant of the Marine Corps Gen. James Con-way declared energy a top priority. Mere weeks later, the U.S. Marine Corps’ Expeditionary Energy Office (E2O) was born and tasked with analyzing, developing and directing the Marine Corps’ energy strategy.

“The expeditionary energy office works for the Commandant of the Marine Corps with a mission to innovate and develop the Marine Corps’ energy strategy,” said current E2O Director Col. Jim Caley.

As head of the program, Caley says the work he does is about different parts of the Marine Corps. It is about getting our Marine units further down the battlefield.

Herendeen.

He is using his thesis in the Graduate School of Business and Public Management (GSPM) to look for fuel saving efficiencies by optimizing the manner in which the Marine Corps deploys its premiere combat unit - the Marine Expeditionary Brigade (MEB).

Herendeen’s thesis, “Movement of Fuel Ashore: Storage, Capacity, Througput & Distribution Analysis,” explores the manner in which fuel is moved ashore during MEB operations. He notes that in the absence of contracted fuel delivery, the Marine Corps’ fuel delivery operations are limited. “In light of that problem set, I am looking at how we vary utilization rates and how we use our equipment in those operations. I want to understand how a marginal change in how we conduct operations mitigates the issue.”

But Herendeen is not just looking at how fuel is brought ashore. He is looking at it as it is used once it gets there as well. “It’s less conservation and more operational efficiency,” Herendeen explained.

For example, when you land a MEB, and move all of its associated equipment ashore, there are a lot of decisions that have to be made. When do you move ashore? Who goes ashore? What do they do when they get there?

“Conservation is one of way putting it, but it’s really about how to efficiently use our forces given our [fuel] capacity issues,” added Herendeen.

Herendeen is utilizing the Marine Air-Ground Task Force power and energy model (MAGTF) to conduct his analysis of MEB force composition and deployment options. The MAGTF helps him to analyze fuel outputs down to the gallon per MEB vehicle, and allows him to forecast the demand side of various MEB deployment options.

“Right now we are looking at five different force compositions. What differs between them is when you land certain elements of combat power, specifically different unit types,” noted Herendeen. “For example, do we land as many tanks as we can on day one, or do we phase tank deployments out between day one and day 50?”

According to Hernandez, it is the combination of student research being conducted by students like Katzman and Herendeen, mixed with the program to improve CIGS efficiency and to determine their optimal usage during Marine Corps operations.

Katzman also believes that CIGS are well suited to the Marine Corps because they are relatively easy to make – they are sprayed on in a process known as chemical vapor deposition – and because of their weight and flexibility. CIGS can be sprayed on everything from uniforms, to camouflage netting or the exteriors of tents.

Katzman is using a Technical Computer Aided Design (TCAD) program to improve CIGS efficiency and to determine their optimal usage during Marine Corps operations.

The overall efficiency of this new device is expected to exceed 24 percent, which is almost double today’s performance, with great potential for further improvements with higher output at a lower manufacturing cost and light weight,” said Katzman. “I think CIGS hold promise for the future of the Marine Corps as we seek to reduce our reliance on fossil fuels.”

Katzman’s research was born from the realization that forward deployed Marines have become increasingly burdened by power requirements and battery inventories. He believes that solar cells have the capability to simultaneously lessen supply chains and significantly lighten load for expeditionary units. One novel use of CIGS being explored by Katzman is the concept of a solar powered blanket.

Solar blankets and other CIGS-based, solar energy harvesting devices are relatively inexpensive and may offer a practical solution to Marine Corps energy needs. They also appear to show particular utility in the solar energy rich areas in which the Marine Corps is currently operating.

“When you look at where the Marine Corps has conducted operations in recent years, it has tended to be in areas where there is a ready supply of solar energy that, if harvested, could be used to provide power for Marine operations,” said Katzman.

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Katzman is using a Technical Computer Aided Design (TCAD) program to improve CIGS efficiency and to determine their optimal usage during Marine Corps operations.

“The program solves all of the underlying, physics-based equations allowing us to adjust parameters to give us an idea of why a cell is operating in a particular way,” explained Katzman.

According to Hernandez, it is the combination of student research being conducted by students like Katzman and Herendeen, mixed with engaging classroom discussions and academic development that make NPS such a powerful venue for educating naval officers.

“As a result of this continuing research engagement, NPS is able to develop viable curricula that will serve naval forces while directly supporting the strategic energy objectives of the Marine Corps,” said Hernandez.

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NPS Alumnus Leads Major Changes to Georgian Ministry of Defense

By Kenneth A. Stewart

Naval Postgraduate School (NPS) alumnus Georgian Army Col. Giorgi Jachvadze has managed a series of reforms within the Georgian Ministry of Defense (MOD) that have effectively overhauled the Georgian military personnel system, and directly credits his NPS education for giving him the knowledge and skills that led to these accomplishments, and my NPS classes and thesis played a significant role in the success of these reforms,” he added. “The knowledge and skills that I acquired at NPS introduced me to materials, practices and methods that helped me to decisively elaborate and implement the ideas and projects that led to these successes.”

“The transition to a pay-by-rank compensation system was a huge success for the MOD and it was recognized and appreciated by NATO partner countries,” said Jachvadze. Yet the transition to a pay-by-rank system was just one of many reforms overseen by Jachvadze and his staff. Under his leadership, the MOD has also implemented key reforms in the areas of promotions, selection board processes, recruitment and retention systems, pre-enlistment psychological screenings, and military pay and compensation. These reforms have been integral to advancing [Georgia] on its path to NATO membership,” said Hatch.

“The plan was followed by a concerted effort to communicate the need for change and to explain the path forward. Jachvadze led informational briefings throughout the MOD in nearly every command and unit within the GAF in an effort to overcome the resistance to the transition and to explain its merits. “The transition to a pay-by-rank compensation system was a huge success for the MOD and it was recognized and appreciated by NATO partner countries,” said Jachvadze.

“Together with his NPS classes and thesis, the knowledge and skills that I acquired at NPS introduced me to materials, practices and methods that helped me to decisively elaborate and implement the ideas and projects that led to these successes,” NPS Senior Lecturer retired Navy Cdr. Bill Hatch served as Jachvadze’s thesis advisor during his time at the university. Col. Giorgi Jachvadze J1, Head of Manpower, Personnel Georgian Armed Forces

Swedish Army Capt. Robert Humeur and German post-doctoral researcher Sascha Pauly are studying the latest advancements in Electronic Warfare (EW) in hopes of improving the ability to counter EW threat emitters. “It’s highly important to detect and identify these types of threat emitters as they create a barrage of noise jamming certain bandwidths that we use in our ground-based air defenses,” said Humeur.

Humeur’s thesis, “Experimental Testing of a Photonic Direction Finding Electronic Warfare System,” involved the building of a prototype receiver that is capable of detecting the origin of enemy emitters. With Pauly’s help, who is detailed to NPS through the Engineer and Scientist Exchange Program, he’s been testing it in the Anechoic Chamber Lab in the NPS Department of Physics. Humeur is a seasoned expert in the art of electronic warfare, serving three tours in Afghanistan as an EW officer specializing in air defense systems. He has worked on a wide variety of EW sensor systems, and has been actively involved in the evolving field of signal detection.

Student’s Prototype May Counter EW Threats

By Kenneth A. Stewart

NPS student Swedish Army Capt. Robert Humeur observes a radio wave on a digital analyzer at Spanagel Hall’s 6th floor anechoic chamber. Humeur and post-doc Sascha Pauly are working to advance research into the ability of Electronic Warfare (EW) to counter threat emitters.

“[Jachvadze] led the implementation of many reforms outlined in his thesis, ‘Quantitative Analysis in the Georgian Armed Forces Manpower/Personnel Policy Decision Making Using Markov Models.’ These reforms have been integral to advancing [Georgia] on its path to NATO membership”
Naval Postgraduate School (NPS) alumnus and retired U.S. Navy Vice Adm. Michael C. Vitale shared a career of lessons learned in innovation with NPS students during a Secretary of the Navy Guest Lecture (SGL) at King Auditorium, Aug. 11. During the SGL, Vitale received the NPS Distinguished Alumni Award from President retired Vice Adm. Ronald A. Route.

"All of you officers are going to be leaders, and at some point in time you will take command. In order to command, you have to build a successful team. In order to build a successful team, you have to have good tools in your toolbox. Today, I would like to add innovation to your tools," continued Vitale.

"We are at a pivotal moment in our history. We are coming out of more than 14 years of hard fighting, including the longest war in our nation’s history," he said. "We are witnessing a more multipolar world where American leadership is being increasingly challenged, perhaps no more so than in the military realm.

"Such challenging and uncertain times demand that America’s best and brightest step forward to serve and to lead," Work said. "Because, to preserve the peace, we must continue to demonstrate our ability to project combat power anywhere in the world, no matter what threats we may face. We do so because that is what our friends and allies expect of us. They expect us to lead.

"Work also noted that innovation is at the heart of maintaining U.S. power.

"Since World War II, the United States has enjoyed unrivaled technological superiority," he said. "That lead is eroding at a pace too fast for comfort, and as a result, the margin of battlefield overmatch we have long enjoyed is becoming ever slimmer.

"Work challenged the graduating class to be innovative and to seek new solutions and better business practices. He offered the university’s diverse student body a few notes of sage advice in closing his address to students.

"To all of you, BZ, well done, and to our many international students, I hope you had a rewarding stay here at NPS … You bring an important diversity of views that Americans must have and value in today’s global security environment," Work said. "We will not always see eye to eye in every challenge we face around the world … [but] someday, in some unforeseen way, the relationships and understanding that you forged here today will serve both of our countries well.

"To the American Soldiers, Sailors, Airmen, Marines and DoD civilians here today, I want to thank you for stepping forward and choosing to serve our country during this difficult period in our nation’s history," Work concluded.

"You are part of a proud tradition of voluntary service that extends back to the continental Army and Marine Corps. The secretary and I and the entire nation are absolutely grateful everyday for your willingness to serve," he said.
**Commander, Naval Surface Forces Establishes Surface Warfare Chair at NPS**

By Kenneth A. Stewart

The Naval Postgraduate School (NPS) in conjunction with Commander, Naval Surface Forces, Vice Adm. Thomas S. Rowden recently established the university’s first-ever Surface Warfare Officer (SWO) chair. The chair will serve as a mentor and a liaison between the surface Navy community and NPS students, faculty and staff.

“It gives me great pleasure to establish a SWO chair here. I have been dreaming about doing this for a very long time,” said Rowden. “NPS brings three powerful assets to the table that no other single institution can match – human capital in the form of a student body composed of mid-career naval, military and defense professionals; intellectual capital in the form of a faculty with deep ties to both academia and the defense establishment; and physical capital in the form of laboratories, centers, facilities and this beautiful and historically significant campus,” said Rowden.

In an effort to leverage those assets, Rowden assigned NPS alumnus Capt. Charles Good to NPS. “It’s Capt. Good’s responsibility to take the value of NPS to the fleet so that we can take those young, great intellectual minds that are serving on our ships and get them properly synced up with the faculty here in order to provide them the opportunity to achieve all of the greatness they can.”

“Think all of us are smarter than one of us and that if we can bring [NPS and the SWO community] together in a meaningful way, the opportunity to really improve not only the richness of the experience here in Monterey, but also the value that experience brings to the fleet, can be increased by orders of magnitude,” Rowden continued.

Good is returning to NPS after a nearly two-decade absence. He notes that NPS’ outward appearance has changed very little in the last two decades, but that the number and diversity of programs offered by NPS has increased dramatically.

“It feels great to be back on campus. I graduated about 19 years ago with a Master in National Security Affairs with a focus on Europe and Eurasia,” said Good.

“We have a great blending of faculty here, some academic powerhouses, as well as some folks who have served in the surface warfare community before getting their academic credentials. We need to do everything that we can to leverage all of that [intellectual capital] to the maximum amount that we can,” said Good.

While at NPS, Good intends to focus on matching NPS students with surface warfare research needs and guiding them along career paths that will not only enhance their academic experience at NPS, but will benefit the surface warfare community as well.

“I can serve as a conduit. The fleet can send issues, concerns and initiatives to me and I can tie them to interested students and faculty on campus,” said Good. “Having the students do surface warfare related theses is a big step, it ensures that they remain grounded in the community while at the same time getting exposure academically.”

**Defense Analysis Students Sweep CJS Essay Competition**

NPS Department of Defense Analysis students, Capt. Charles Good, NPS Surface Warfare Chair and Capt. Pat Duggan, have been awarded first-place in the 2015 Chairman of the Joint Chiefs of Staff (CJCS) National Defense and Military Strategy Essay Competition. Schultz and Duggan were honored by the chairman this fall, with their award-winning essays to be published in a future edition of “Joint Forces Quarterly.”

Duggan took first place in the competition research paper category for his essay, “Strategic Development of Special Warfare in Cyber-Space.” Schultz took first place in the 1,500-word strategy article category for his piece, “Countering Extremist Groups in Cyberspace.”

“A big reason we were successful was because of the resources that NPS provided us, from faculty to materials,” said Schultz. “At NPS, I was able to tap into the vast resources and people that were available to us and through that assistance, we were able to turn over our work. This is a topic that I am passionate about,” added Duggan. "This award really speaks to the quality of education that is ongoing here at NPS.”

NPS has been central to officer development and career progression within the SWO community for many years. And according to Good, graduate education at NPS is an integral part of the process by which SWOs are groomed for future leadership positions.

“NPS has been, is, and will continue to be the core of the SWO graduate education delivery into our career path,” said Good.

SWOs complete their initial fleet tours relatively early in their careers. Coming to NPS allows them to catch their breath between deployments and allows them to gain skills and education that will serve them well when they return to the fleet as department heads and when they take their knowledge and experience back ashore to the Pentagon and other major staffs, noted Good.

“Nearly every single one of the SWO students on campus is a prospective department head. They are career minded, mid-career professionals. Coming to NPS is a natural fit in their surface warfare career progression” said Good.

“It is beneficial for junior officers to spend their initial shore tour here in Monterey and get their graduate degree and [Joint Professional Military Education] JPMIE Phase 1 complete before heading back to the fleet and their department head tours,” explained Good.

For Rowden, placing a SWO chair at NPS is about ensuring that valuable, defense-focused graduate education is not lost and that its benefits are able to be combined effectively with other professional military education venues throughout the Navy.

“I think it’s really important that everyone, not only across the surface Navy enterprise, but across the Navy, understands just how critical and just how valuable the Naval Postgraduate School is to the many, many things that we are doing,” said Rowden.
Naval Postgraduate School (NPS) student intern Julian Brown holds the star tracker system he developed during a summer in the university’s Space Systems Academic Group. The low-cost star tracker is designed to help very small satellites determine their orientation in space.

“Because satellites are becoming so popular in research, we would like to develop our own non-private star tracker that we can build ourselves and hopefully pass off to private industry once we have designed the basics,” said Brown.

Newman agrees. His goal is to develop a government-owned, government-shared star tracker whose technology can be transferred to industry and spur motivation to improve the existing star trackers on the market.

Intern Develops Small, Inexpensive Star Tracker

By Kenneth A. Stewart

Naval Postgraduate School (NPS) student intern Julian Brown is just 21 years old, but don’t let his young age fool you. He’s a serious scientist, and spent a summer at NPS working on a star tracking system designed to help very small satellites determine their orientation in space.

After graduating from the Massachusetts Institute of Technology (MIT) with a degree in electrical engineering and computer science, and then interning with the Space and Naval Warfare Systems Command (SPAWAR), Brown made his way to NPS, working with Professor and current Acting Provost Jim Newman through the Office of Naval Research’s Naval Research Enterprise Internship Program (NREIP).

“As I was reviewing resumes for the summer of 2014, his stood out … He had shown interest in trying to do some really hard projects,” said Newman. “Professor Mathias Kolch and I had been working part-time with students on developing a low-cost, very small star tracker to challenge the price point that industry currently provides, and I realized this would be a great project for Julian.”

“A star tracker is used to take a picture of the sky and identify the patterns of stars in an image,” explained Brown. “Based on this, a satellite can tell which direction it is facing. Because stars are little specks of light that don’t move, it is very easy to know where you are looking if you know which stars you are looking at.

“It’s cool stuff,” Brown continued. “I’ve known what I wanted to do since I was 5 years old. When I learned that the Navy was sponsoring research, I knew this would be a great project for Julian.”

Star trackers have been used in various forms since ancient times. The sextants used by ancient mariners are an example of early star tracker technology. And though the star tracker developed by Brown is far more complex than a mariner’s sextant, it is similarly designed to tell an operator where his craft is relative to the stars in the sky.

“When taking pictures of the stars for general navigation, there are many systems that provide coarse attitude information offering accuracy down to a tenth of a degree,” Newman explained. “But if you want accuracy down to arc seconds, 1/3600 of a degree, then you need to use a star tracker,” explained Brown. “They offer the highest accuracy pointing that you can get in space. They are very valuable for a lot of different missions and we would like to make them accessible to research groups like the one here at NPS.”

Star trackers are currently employed by most large commercial satellites, but they are generally too large and too costly to be employed aboard small satellites.

“They are also really expensive. A good model will cost hundreds of thousands of dollars and installing a single star tracker on a nanosatellite would wipeout a significant portion of your total satellite budget,” said Brown. “We want to create much cheaper star trackers and put them on satellites that would not normally be able to afford them due to budgetary constraints.”

Brown’s work comes on the heels of increased research interest in satellite technology and greater industry and academic reliance on the information gleaned from commercial satellites.

STEM at NPS

In just a few short years, opportunities for STEM internships at the Naval Postgraduate School have blossomed, with nearly 100 high school and college students from across the U.S., and then interning with the Space and Naval Warfare Systems Command in space.

Adam Babiak, Distributed Information Systems & Experimentation Project, Naval Postgraduate School (NPS), explains star tracker technology. And though the star tracker developed by Brown is far more complex than a mariner’s sextant, it is similarly designed to tell an operator where his craft is relative to the stars in the sky.

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CANDIS MARTIN (’13)
PROGRAM: Community College Catalyst Program
MENTOR: Dr. Tim Chung, Systems Engineering
NOW: Enrolled in Master in Science in Information Assurance program at NPS through Scholarship for Service program.

NATALIE ORTIZ (’13, ’15)
PROGRAM: Science and Engineering Apprenticeship Program (’15), Naval Research Enterprise Internship Program (’13)
MENTORS: Sue Higgins, Cabraswski Institute, and Dr. Jim Newman, Space Systems (’15)
NOW: Computer science major at UC San Diego

ATAY JAIN (’14)
PROGRAM: Science and Engineering Apprenticeship Program
MENTOR: Dr. Tim Chung, Systems Engineering
NOW: A high school senior currently applying to MIT, UC Berkeley, Harvard and Stanford to study computer science.

BRANDON NAYLOR (’14)
PROGRAM: Naval Research Enterprise Internship Program (’13)
MENTOR: Dr. Dan Nisnbaum, Energy Academic Group
NOW: Employed as a contractor with NPS Energy Academic Group, set to graduate in the fall with aMechanical Engineering and Robotics degree from the Rose Hallman Institute of Technology.

STUFI VISHWALIAN (’15)
PROGRAM: Science and Engineering Apprenticeship Program
MENTOR: Dr. Ying Zhao, Information Sciences
NOW: A high school senior, launched and runs non-profit “Teach Seniors Technology” organization.

DANIEL IBARRA ROJO (’14, ’15)
PROGRAM: Community College Catalyst Program
MENTOR: Dr. Arijit Das, Computer Science
NOW: Volunteered to continue his work with Dr. Das while studying computer science at CSU Monterey Bay.

JORDAN RUFF (’15)
PROGRAM: Naval Research Enterprise Internship Program (’15)
MENTOR: Dr. Ned Powley, Graduate School of Business and Public Policy
NOW: A senior at Marquette University majoring in psychology and Spanish, with a minor in ethics. Plans to enroll in graduate school programs in mental health counseling, specializing in care for military personnel and their families.

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NPS Honors Summer Graduates During Quarterly Ceremony

By Kenneth A. Stewart

The Naval Postgraduate School (NPS), along with a packed house of faculty, family, friends and well-wishers, said farewell to 330 graduating students earning 335 degrees during NPS’ Summer Quarter Commencement ceremony in the university’s King Auditorium, Sept. 25.

“My experience here was humbling,” said Sgt. Robert Brady, a supervisor in the New York Police Department’s (NYPD) counter-terrorism unit. Brady earned a Master of Arts in Security Studies through NPS’ Center for Homeland Defense and Security (CHDS).

“Being put together with such a diverse group of people from so many different disciplines was excellent,” added Brady. “We challenged each other and drew out the best in one another to become better homeland security professionals.”

Military Officers Association of America (MOAA) President retired Vice Adm. Norbert R. Ryan Jr. was the ceremony’s keynote speaker.

“I can’t tell you how inspired I was to watch you all file in this morning … This nation’s greatest treasure is the young men and women that serve,” he said.

Throughout Ryan’s emotional address to the graduating class, he shared moving stories and anecdotes from his military career, drawing largely upon lessons learned while observing service members overcome incredible odds. He also spoke of leadership, and the commitment to serve that he has witnessed in men and women from all walks of life.

“Leadership is not about words, we all know that,” he said. “Leadership is about example.”

In closing, Ryan called for the assembled students, faculty and staff to always advocate for their fellow service members and their families.

“All of us collectively … have to make sure that the 99 percent of the population that have not served keep their commitments to those that have served and those that will serve in the future,” said Ryan. “Please speak up to your elected officials about the importance of keeping our commitments to the men and women, and their families, that have kept us free for the last 14 years.”

Ryan was recently recognized as one of the 100 most influential and impactful veterans on Capitol Hill. Under his leadership, the MOAA has been named a “Top Lobbyist” by The Hill newspaper for the past eight years.
“NPS Is Everywhere”

During an Iraqi Air Force F-16 dedication ceremony at Balad Air Base earlier this year, three of the U.S. officers in attendance recognized each other. Although they worked for different organizations, some were even members of different services, they knew there was some sort of connection between them. And there was … the Naval Postgraduate School’s Department of National Security Affairs.


The chance meeting and subsequent discussion offered an opportunity for the trio to reflect upon their time at NPS, and the role the education has played in their assignments following graduation. McCullough went on “to be the Turkish political/military advisor at [U.S. European Command] EUCOM where the education I received at NPS was used every day,” he said.

“Before I deployed I was at the Under Secretary of the Air Force for International Affairs (SAF/IA) at the Pentagon. Here I dealt with technology transfer issues for Foreign Military Sales cases. Again, the experience of NPS came in very handy,” McCullough continued.

Sylvester, who has since served as a Director of Theater Security Cooperation, a Senior Naval Advisor, and is slated to be the next Defense Attaché for Saudi Arabia, echoed these sentiments.

“The NPS degree in Security Studies, with a Middle East focus, has given me a great base to fall back on,” he said. “Coupled with language training, I am quite functional interfacing with our foreign partners, and am thankful for the opportunity!”

Given their current assignments, the trio embody the precise value of just one of NPS’ many academic programs in preparing military leaders to be more effective … Perhaps stated best by McCullough.

“All of these experiences, along with the foundation of my NPS education, have been critical to the day to day dealings with the Iraqi government,” he said. “My awareness of the different cultures and norms of this country were shaped by the experiences of the professors at NPS … It is an experience which I cannot undervalue.”