



(U.S. Navy photo by Javier Chagoya)

NPS Hall of Famer, Distinguished Alumna Returns to Campus for SGL

By Javier Chagoya

Retired Vice Adm. Patricia Ann Tracey, an NPS Distinguished Alumna and Hall of Fame member, returned to her alma mater, to offer unique perspectives on her experience at the university, and her distinguished career following, during the latest SGL in King Auditorium, Feb 14.

Tracey was the first American woman to be promoted to the rank of vice admiral, and was the highest-ranking female officer in the U.S. military in 2004. With a distinguished 34-year career in the Navy, and a dozen more years in a Fortune 500 company behind her, Tracey shared views on her time as a naval officer, in industry, and on becoming part of change.

"I look back at my time at NPS as the best tour I ever had, mainly because I was able to pause and reflect here, and to enjoy learning new things that would eventually help to shape the way I think in a strategic way," said Tracey.

Tracey suggested that her return to academia was not unlike other risks one must take in life, to step out of a comfort zone and test one's resolve. And of relevance to her audience at NPS, to change how the mind is shaped to become a better officer and leader.

"What matters when you graduate from NPS is that you perform in your job with a different point of view of understanding problems. It's about the coalescing of what you've learned," she added.

With Tracey's departure from the Navy in 2004, she was recruited by Electronic Data Systems (EDS), now HP Enterprise Services.

"I was fortunate enough to be recruited by EDS, the company that brought the Navy Marine Corps Intranet to our Sailors and Marines. They were committed to bringing magnificent technical support to our services, and it was the magnificent people that I was working side by side with that I regarded. HP was a demanding place to work. There is no crew rest in this fast-pace environment," she said. "You must consider fear and risk in being the first to do something new in industry and it's just as risky as doing it first in DOD.

"Learn to think differently and consider other alternatives in evaluating the return on risks to success. Money is the most readily recognized way to incentivize anything. And many companies struggle to understand that doing something that matters is what really motivates people," concluded Tracey.

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NAVAL POSTGRADUATE SCHOO



WOMEN'S HISTORY MONTH

March 2017

NPS, Academic Partners Take to the Skies in **First-Ever UAV Swarm Dogfight**

By Javier Chagoya

The site is Camp Roberts, a California National Guard base in south Monterey County that is also home to one of the most unique experimentation areas in the region, boasting 42,000 acres of diverse terrain and specialized ranges including the restricted air space that is critical for research in the skies. It was here that scientists from two universities have converged onto the site, February 9, 2017, to duke it out in a never-before-achieved swarm vs. swarm unmanned aerial vehicle dogfight.

For Naval Postgraduate School (NPS) Associate Professor Ray Buettner, it feels like a historic occasion.

"It is always difficult to know the impact of an event on the future. When the Wright brothers flew for the first time at Kitty Hawk, it is unlikely that they or the folks watching could imagine that manned flight would take humanity to the moon only 66 years later. As we watch the first 'dogfight' between swarms animated by different forms of artificial intelligence, I am compelled to wonder where swarming technology will lead us six decades from now."

The match is between two university teams the are well aware of the each other's reputation in the field, NPS and Georgia Tech Research Institute (GTRI), but this contest isn't about bragging rights. Rather, this experimentation is to test the capability of autonomy and to learn

the experimentation first-hand. "This is an outstanding example of the translation of great research into experimental practice."

Officials say the collaboration between NPS, GTRI, and the

Defense Advanced Research Projects Agency (DARPA) also

serves as an incubator for ideas and a catalyst for innovation.

"This is a great opportunity to grow and see what happens outside

the simulated environment," said GTRI Senior Research Engineer

how behaviors between each of their team's aircraft react as they penetrate the opponent's air space.

In short, the goal of this research, according to researchers and institutional leadership alike, is in the science, to answer questions in optimization and controls, and to envision how these capabilities advance the warfighter's effectiveness.

"One of the only ways to find out if the ideas we have built in labs and in experimental test beds actually work, is to bring them outside into something that closely approximates how they might perform in an actual warfighting setting," explained NPS Provost and Academic Dean Dr. Steven Lerman, on hand to witness

A swarm of unmanned aerial vehicles get into a self-determined formation during swarm vs. swarm field experimentation at Camp Roberts, *California.*(U.S. Navy photo by Javier Chagoya)

Kevin DeMarco. "We sort of wall ourselves off in academia without having access to people with real field experience. The NPS faculty and research team has that real-world experience."

DeMarco recently earned his doctorate in Electrical and Computer Engineering from Georgia Tech and has been conducting research with human-robot interaction scenarios for some time. DeMarco and other researchers in the GTRI lab have been improving sensors and swarming scenarios with its own flight of aircraft. In May of 2016, GTRI launched a successful, 30-drone swarm with a catapult system of 10 launchers that use compressed air and can load and launch in one-second intervals.

DeMarco's team uses Base Theoretical Swarm Controls, which sort data between different altitudes, non-altitude separated flight and collision avoidance algorithms in their programming.

"With today's experiment we have myself, Senior Research Scientist Charles Pippin, Research Engineer David Jensen and Research Associate Michael Day. And we also have three support staff back in Georgia at the GTRI lab," said DeMarco. "We can e-mail code that we're preparing here on the fly, have the support staff verify it using GTRI's high performance computing and they send it back to us to upload into play.

> "What's really interesting about this experiment is that it's the first intercollegiate competition in the swarm versus swarm arena and its really informing us how to compete in larger, more complex competitions," he added.

> NPS' Advanced Robotic Systems Engineering Laboratory (ARSENL) has employed a commercial off the shelf platform, the Zephyr, since 2012 for its swarm research.

> The ARSENL lab, made up of faculty, students and research associates, uses various networking technologies to achieve the types of autonomy needed for successful swarm operations. The lab utilizes its own unique launch

system developed by an NPS student, a chain-driven catapult that pushes the aircraft out at 35 mph. Once aloft and clear of the launcher, rotation begins immediately with the small electric motor that revs up the propeller into a high pitch whir and zips the UAV into a steep climb.

DARPA Program Manager Tim Chung, a former NPS assistant professor who played a leadership role in establishing the ARSENL lab, describes how the drones conduct their engagement on each other.

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"The battle cube is a vertical column of air space with a demarcation, separating each team's swarm. The UAVs swarm and self-organize into their patterns, they select a leader based on an aircraft's best position to engage their opponent. Each drone continually assesses its place in a tiered hierarchy so as to benefit the goal," Chung explains. "Think of The Borg from Star Trek's Next Generation, the collective or hive minded drones that are driven by a need for perfection."

Chung continues to describe attributes drones will take on as they learn to defeat opponents through evasion and counter-measures in the decentralized, ad hoc doctrine.

"The aircraft, either singly or in groups, choreograph their next move into a defensive or offensive pattern. What's not being seen are the huge amounts of data being sent over a Wi-Fi network that provides each of the team's aircraft a three-dimensional battle space picture. This simultaneous sharing of information between the drones induces the concept of mass, coordination, intelligence and speed to the battlefield," described Chung.

One observer who cranes his neck upward as the swarms whiz by overhead in formation is retired Marine Corps Brig. Gen. Frank Kelley, who now serves as the first-ever deputy assistant secretary of the Navy for Unmanned Systems. Kelley has only been in the job a little over a year, but is very optimistic about autonomy's future.

"I'll tell you, my expectations have been fulfilled with coming out to Naval Postgraduate School and to Camp Roberts, to see the hardware, to see the experiment being conducted and to meet each of the researchers from NPS, DARPA and GTRI," said Kelley.

"Swarming technology is incredibly important. Remember, we don't accomplish any mission with just one vehicle, one aircraft, or one Sailor or one Marine. There are teams of Marines, Sailors and platforms working together in a combined arms approach. There's no way that we shouldn't be able to look into the future and see how that's going to apply across all platforms," added Kelley.

"The technology that has been developed in our universities, our warfare centers, and institutions like NPS and DARPA now makes those concepts available. And the folks that are thinking how we're going to operate in the future, realize that there's a huge part to be played by autonomous systems," said Kelley. "I can't think of a domain where that isn't going to work in the future – underwater, on the surface, in the air and quite possibly in space as well."

Seeing the successful experiment has Kelley imagining the possibilities of the future of unmanned systems. "I'm absolutely confident that this will be able to scale ... I honestly believe there are no technical hurdles that we can't overcome. We need to think about the cultural and social aspect of the man-machine interface and tap into the potential of both," exclaimed Kelley.

GTRI Research Scientist in robotics Michael Day, also a former research associate at NPS, and his team has been collaborating with NPS to resolve issues with eliminating radio noise over their network communications.

"The benefit of our collaboration with NPS is that we come from different worlds. NPS is directly connected to the military. They have access to Soldiers who have been in theater recently, so they know what the existing threats are and what research needs to be done to counter them," Day explained.

"GTRI gets a lot of insight into what is needed in the DOD and we get another point of view. We both benefit with the exchange of points of view, we both look at algorithms in slightly different ways, and we can swap ideas," Day continued.

And speaking of friendly competition, researchers take a politically-correct approach to declaring win or lose. Buettner says that NPS won one match, tied one match and lost one match. "What I would say is that both NPS and GTRI won in terms of the science," he added.

"The simple fact is that swarms flown by each team executed their behaviors perfectly in that they generated the data that we needed to collect. The hard work of data analysis is just beginning," continued Buettner. "The real winners of the competition are the citizens of the United States, as the U.S. Navy remains at the forefront of exploring these rapidly developing technologies.

FACULTY news & notes

William Kelley and Stanley Supinski received the Founders Award during the 2017 NPS Center for Homeland Defense and Security (CHDS) Alumni Professional Exchange (APEX) in the Barbara McNitt Ballroom, Feb. 23. Kelley and Supinski have been with CHDS in various roles since 2002.

"The Founders Award is awarded to individuals who have made vital contributions to the establishment of CHDS, and the ability of the center to serve the nation," said center director Glen Woodbury. "Kelley provided a rigorous recruitment and application process for CHDS, and Supinski was the first director of the CHDS University and Agency Partnership Initiative (UAPI)."

Both awardees have worked tirelessly to contribute to CHDS' ability to educate homeland security professionals of all levels.

NPS Department of Applied Mathematics Associate Professor Lucas Wilcox has been named winner of the 2016 Menneken Award for Highly Meritorious Research for a Junior NPS Faculty Member for his efforts in advanced algorithms for real-world applications. Wilcox says he is thankful for an environment on campus that supports young faculty member's need to research and publish.

"They foster and support a young faculty member's ability to focus on teaching and research," noted Wilcox. "You do some service to the department, but the focus is to help you get a good footing to progress here."

Wilcox says he has found several benefits to employment in an academic environment.

Have a story to share? Public Affairs is constantly seeking interesting news and stories for Update NPS. Send your tips to pao@nps.edu.

Navy Turns to NPS to Develop Sea Hunter's Potential Future Missions

By MC2 Michael Ehrlich

The Anti-Submarine Warfare Continuous Trail Unmanned Vessel (ACTUV) workshop was held in NPS' Mechanical and Aerospace Engineering Auditorium, Feb. 14. The focus of the workshop was to develop possible mission sets for the Navy's new autonomous Sea Hunter.

eager to hear from NPS students who brought more insight than he had anticipated.

"I think NPS is a unique institution in terms of having the right mix of people to help us get at some of these questions, because the students

have operational backgrounds," said

Littlefield. "They have

been in the fleet recently

so they bring that

perspective that helps

us understand not only

the technology but how

the technology will be

Research Associate

Brian Wood helped

coordinate the workshop

with DARPA, bringing

together members

of several different

disciplines along

with students who

are presenting thesis

proposals on subjects

from acquisitions to sonar detection.

"Antisubmarine warfare

is the primary capability

envisioned for Sea

used."

"I think we are already seeing new missions emerge out of our study for how unmanned systems can be used," said Deputy Assistant Secretary of the Navy for Unmanned Systems, retired U.S. Marine Corps Brig. Gen. Frank Kelley. "Often our missions are dictated because we have a human actually on the platform, or thousands in the case of a carrier. When we are able to take the traditional missions that we have today, and do them with unmanned systems, a lot of our problems get solved."



Deputy Assistant Secretary of the Navy for Unmanned Systems, retired U.S. Marine Corps Brig. Gen. Frank Kelley, gives the keynote address at the Anti-Submarine Warfare Continuous Trail Unmanned Vessel (ACTUV) workshop held in NPS' Mechanical and Aerospace Engineering Auditorium, Feb. 14. (U.S. Navy photo by MC2 Michael Ehrlich)

Sea Hunter's Program Manager at DARPA,

Scott Littlefield was a key participant in the effort, providing some of the critical questions discussed among the NPS students and faculty, and the visiting subject matter experts. In addition to the breakout sessions discussing these questions, Littlefield was Hunter during its development, but the vessel is clearly capable of more," said Wood. "Other missions that are being looked into are intelligence, surveillance and reconnaissance, as well as mine warfare, electronic warfare and command and control operations.

NPS' Graduate Writing Center Sets Record

By MC2 Michael Ehrlich

Director of the Graduate Writing Center (GWC) Sandi Leavitt and GWC Deputy Director John Locke have grown the university's advanced writing program into a well-utilized support function for NPS students returning to the rigors of academic writing. In fact, the GWC set a handful of attendance records this quarter thanks to growing demand from students seeking out this invaluable service.

"At NPS we don't do creative writing, we do creative research and we create new knowledge," said Locke. "But without clear communication in writing, the knowledge will disappear." The GWC has expanded to nine coaches with 25 workshop sessions offered during the first four weeks of each quarter.

"Students have said the workshops have been very helpful," said

Leavitt proudly. "Just as advisers work on content in the lab, we are working on how to write a literature review, or how to write out your results, or how to best describe the information.

"The writing center helps students to prepare to write a thesis," she continued. "It gets their skills up to speed with workshops that cover the mechanics, like how to build better sentences, how to cite correctly, a refresher on grammar and punctuation. We also do organization, and critical thinking."

With the recent addition of new writing coaches, the GWC has surpassed itself each quarter, fielding 1,140 scheduled appointments with students in the 2016 Fall quarter, and set records for individual appointments and students served in a single week this Winter quarter.

NPS Enlisted Cyber Student Promotes to Warrant Officer

By MC2 Brian H. Abel

Chief Warrant Officer 2 Robert LaBrenz is in very rare company, being one of the only enlisted Sailors ever to be commissioned as an officer while enrolled at NPS.

"This is just the beginning of a whole new chapter," said LaBrenz, currently studying in the university's Master of Applied Cyber Operations (MACO) program. "It represents for me an attainment of a certain level of



Chief Warrant Officer 2 Robert LaBrenz is pinned by his wife during his promotion ceremony in Herrmann Hall, Feb. 3. (U.S. Navy photo by MC2 Brian H. Abel)

experience, and even a certain saltiness I'd like to think that I now embody."

LaBrenz spent nine years climbing through the ranks as a junior Sailor, followed by more than nine years as a Chief. He looks forward to what this next step in his Navy career will bring.

"It depends on what happens over the course of the coming years," said LaBrenz. "I think that it's kind of cool, and that right there will give me, personally, a good perspective on the different facets of the Navy."

LaBrenz also expressed his enthusiasm on being part of such a rare feat among his fellow and past NPS graduates.

"It's absolutely fantastic because it's a matter of the stars aligning for me to come here," said LaBrenz. "Everything worked out perfectly ... For me to be able to come here was a happy coincidence where everything fell into place."

NPS Invites Tech Community to Hack the Ship

By MC2 Victoria Ochoa

NPS' Center for Cyber Warfare (CCW), in partnership with Defense Innovation Unit Experimental (DIUx) and the NPS Foundation, hosted the second in a series of hackathon events designed to bring the tech community closer to the Navy's challenges.

Called Hack the Machine, the event in Austin, Texas, February 17-19, hoped to infuse new ideas and innovation into maritime cybersecurity.

"What we're trying to do is raise awareness about the importance of maritime cyberspace so that we can keep safe ocean travel possible," said CCW Director, Cmdr. Zachary Staples. "Our mission is to win wars, deter aggression, and maintain freedom of the seas, and maintaining freedom of the seas is really why got a Navy over 200 years ago."

With an increased globalization of trade, over 80 percent of the world's tangible GDP is loaded onto a ship at any given time, moving from the manufacturer to the market. Staples says this means a significant portion of the world's economy is dependent on the infrastructure and transportation systems that help goods get to their destinations safely.

"The real purpose of the hackathon is not necessarily the technological outcomes that may come out of it, it's about creating a culture of innovation around a particular element of cyberspace that the world is so dependent on. And if it were ever threatened we, the Navy, would be asked to do something about it," said Staples.

That culture of innovation Staples is looking to build means getting the military to work alongside young, driven technology innovators.

"We feel like it's important to build a community of practice that's not just the Navy; it's industry, it's academia, and it's young entrepreneurs and innovators that will bring new ideas into this space," said Staples.

CAMPUS news & notes

NPS has been recognized as a Corporation for Education Network Initiatives in California (CENIC) Charter Associate. Charter Associates comprise the CENIC Board of Directors and set policy and guide the organization, as well as having full access to CENIC's entire portfolio of networks and services.

"CENIC is the only educational research network with the capabilities to interconnect the top research universities with state-ofthe-art equipment and services," said NPS Deputy Chief Information Officer for Operations, Chris Gaucher. "It's the only network that meets the highest internet connectivity levels necessary for NPS and its research university partners.

"These connections, along with CENIC's unique bandwidth are vital in ensuring NPS meets mission goals of providing advanced level education to its students," added Gaucher.

A longtime member of the NPS community Cmdr (ret.) Lester "Les" Carr passed away Feb. 28. Les came to NPS in 1985, earning a PhD in Meteorology in 1989; his dissertation supervisor was Professor Russ Elsberry.

Les returned to NPS in 1992, taking a position as a Military Faculty member until 1997, at which time he became a research assistant professor in the Department of Meteorology until 2001.

In 2004, Les returned once again to NPS as a visiting professor in the Department of Applied Mathematics, performing so well that in 2006, he accepted the offer of a permanent position in the department as a lecturer.

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ONR Head of Ocean Battlespace Sensing Discusses Past, Present, Future of Robotics

investigators in ONR's "Rolodex."

By Javier Chagoya

Office of Naval Research (ONR) Science and Technology department head Frank Herr heads the Ocean Battlespace Sensing Department at ONR and is a key sponsor for several UAV and unmanned underwater vehicle (UUV) projects underway at NPS.

Herr came to NPS to observe the swarm vs. swarm Joint Interagency Field Experimentation (JIFX) program being conducted at Camp Roberts later this week. He also serves as the program manager

for the university's long-standing Consortium for Robotics and Unmanned Systems, Education and Research (CRUSER). He spoke to members of the consortium in the Mechanical and Aerospace Engineering Auditorium during his visit to campus.

"This is ONR's 71st year of bringing together technological advances in science, which benefit the Navy and Marine Corps warfighter. ONR's charter is a mere three pages, but has had far-reaching impact on innovation in the sciences," said Herr. "It contended to remobilize those labs and many of its scientists who helped to win World War II. And now combined with our five other departments and 450-employee workforce, in the U.S. and overseas, we are moving ahead in many tactical areas" said Herr.



Office of Naval Research Science and Technology (ONR S&T) department head Frank Herr is flanked by a fleet of unmanned aerial vehicles in NPS' Advanced Robotic Systems Engineering Laboratory, Feb. 6. .(U.S. Navy photo by Javier Chagoya)

unmanned vehicles and evasion tactics, all using a wide swath of sensors that can collapse time and area coverage," described Herr.

Herr has been with ONR for 30 years and is the U.S. National Representative for the Maritime Systems Group of The Technical Cooperation Program, coordinating technology among the U.S., United Kingdom, Canada, Australia, and New Zealand. Herr says he considers CRUSER's contribution to ONR initiatives very important, as he sees great usefulness in having all of the services interact with each other on these advanced technologies.

"The unique value that CRUSER brings to the Navy is that the emerging officers who are now lieutenants and lieutenant leaders admirals and program

Herr also extolled the virtue of never losing sight of sound business and best practices, and continuing ONR's network of collaboration with universities, working closely with the more than 12,000 principal commanders will be our future leaders, admirals and program managers, who will look back on my stories, the important research that's being conducted with themselves in the mix," Herr said. "My hope is that they will continue in the field of autonomy."

"Autonomy is a good example of what we're doing right. And what's

exciting to me is this dogfight-induced behavior being injected into the offensive/defensive concept of maneuvering," he said. "As we

move ahead, these types of dynamic mission plans must [be able

to] chase after machines that can learn behaviors as the mission

changes or intensifies. This has to maximize countering underwater-

Focus On ... Diversity

A Monthly Look at Names and Faces on Campus

NPS Student Services Officer Lt. Jesse Iwuji received a NASCAR Diversity Award during a special event at this year's Daytona 500, Feb. 23. The award is given to a minority or female NASCAR developmental driver that exemplifies outstanding performance on and off the track, as well as encouraging awareness and interaction with NASCAR and motorsports.

"I've been selected to receive the NASCAR Diverse Driver award," said Iwuji. "It's definitely an honor to get recognized for this."

Iwuji's participation in the sport keeps him pretty busy on weekends during the racing season, balancing his aspirations in NAS-CAR with his responsibilities at the university.

"Being able to have my name among those people is a pretty big honor, and it shows that NAS-CAR really thinks highly of me," said Iwuji. Part of the award criteria is focused on community service, and Iwuji is no stranger to giving back. One of Iwuji's favorite moments in NASCAR occurred in December 2016 when he finished in the top 10 in points in the K&M Pro developmental NASCAR series.

"Me going from absolutely nothing to finishing Top 10 in points in NASCAR is huge, and that moment having my family and my team there was really big for me," said Iwuji. "I'm looking for-



Lt. Jesse Iwuji, left, accepts the NASCAR Diverse Driver Award.

ward to continuing to progress in NASCAR and doing bigger and better things."

Any Day at NPS ...



Retired U.S. Army 1st Sgt. Hugh "Smitty" Smith, Sr. reflects on the many milestones of his 27-year career during NPS' Black History Month celebration in the Mechanical and Aerospace Engineering Auditorium, Feb. 9. (U.S. Navy photo by MC1 Lewis Hunsaker)



Catherine Stihler, Member of the European Parliament and Rector of the University of St. Andrews, offers her unique insights into the United Kingdom's departure from the European Union during a guest lecture with NPS students and faculty in Glasgow Hall, Feb. 6. (U.S. Navy photo by MC2 Michael Ehrlich)



Seaman Kaitlyn Kretchman, Volunteer Income Tax Assistance (VITA), completes a tax return in the legal office at the Presidio of Monterey. (U.S. Navy photo by MC2 Brian H. Abel)



Lt. Jesse Nunez briefs his thesis, "Particle Filtering Methods for Incorporating Intelligence Updates," during the Military Operations Research Society (MORS) Tisdale Competition, Feb. 16 in Glasgow Hall. (U.S. Navy photo by MC2 Brian H. Abel)



The Naval War College (NWC) Monterey program recognized several NPS students for completing the latest Joint Professional Military Education (JPME) phase 1 program at the top of the class during a brief ceremony in their honor near the NWC program offices in Halligan Hall, Feb. 1. (U.S. Navy photo by MC2 Victoria Ochoa)



Naval War College (NWC) President Rear Adm. Jeff Harley answers a question from a member of his NWC Monterey faculty during his visit to NPS, Feb. 9. (U.S. Navy photo by MC2 Victoria Ochoa)

STUDENT voice

U.S. Marine Corps Maj. Tom Kulisz, Chairman of the President's Student Council

March is upon us and we are finally starting to get a break from the rains so don't forget there is more to life than just keeping your nose buried in books. The weather is getting back to the "Monterey Normal" of 70 and sunny in the afternoons so take a study break when you can and enjoy the outdoors.

If you are looking for something new to try, swing by the NPS Foundation and just ask. From skydiving to SCUBA and kayaking to running or cycling, the NPS Foundation has a club designed to help us get out and explore.

As for our studies, we are almost finished with the quarter and as a result we are all looking forward to wrapping up this set of classes and taking on the next challenge.

Before we shift focus to the new course load, though, please take some time to complete your Student Opinion Forms as they provide critical feedback to the professors and help them make their courses even better for the next iteration. Of note, based on your feedback, the PSC and the Faculty are working to improve the SOF and expect to have an updated version soon. More to follow!

Our next meeting will be Thursday, March 9, in Room 138 of the library. As always, if you're interested in helping and want to represent your schools or departments, contact us and we will tie you in to the PSC. The more feedback we provide to the leadership, the easier it is to make sure NPS is exactly what we need it to be.

Have a story to share? Public Affairs is constantly seeking interesting news and stories for Update NPS. Send your tips to pao@nps.edu.

On Campus this Month

WOMEN'S HISTORY MONTH

March 7

Secretary of the Navy Guest Lecture with Ms. Leanne Caret 3:00 p.m. in King Auditorium





Defense Energy Seminar with Mr. Scott Van Broekhoven 1:00 p.m. in MAE Auditorium





March 23

Women's History Month Celebration 12:00 p.m. in MAE Auditorium





March 31 Winter Quarter Graduation Ceremony 10:00 p.m. in King Auditorium

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Historical Highlights

Over the past few months alone the U.S. Patent and Trademark Office issued six patents to NPS students and faculty for their inventions entitled: Method and Apparatus for Computer Vision Analysis of Cannon-Launched Artillery Video (US 9,563,964), Method and Apparatus for Singularity Avoidance for Control Movement Gyroscope (GMG) Systems Without Using Null Motion (US 9,567,112 B1), Apparatus and Method for Improvised Explosive Device (IED) Network Analysis (US 9,552,391 B1), Method and System for Determining Shortest



Oceanic Routes (US 9,541,401 B1), Electromagnetic Device and Method to Accelerate Solid Metal Slugs to High Speeds (US 9,534,863 B2), and Super Dielectric Materials (US 9,530,574 B1).

These bring the total to 98 NPS patents awarded over the past 44 years, with 54 of those patents issued in just the last 10 years.

Historical Highlights are provided by the Dudley Knox Library.