



# NPS IN THE NEWS

## Weekly Media Report – February 8-14, 2022

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### RESEARCH:

#### [The Quantum Future of Naval Warfare](#)

*(USNI 9 Feb 22)* ... Lt. j.g. Lucian Rombado

As the tech Cold War intensifies with China and President Xi Jinping striving to establish the People's Liberation Army Navy (PLAN) as the dominant maritime power in the Indo-Pacific, the U.S. Navy faces a critical point: Achieve technological superiority for tomorrow's conflicts or surrender its competitive advantage to China. To visualize what falling behind in the race for technology entails, imagine this fictional news briefing set in the near future... Researchers at the **Naval Postgraduate School** are developing quantum sensing technology to "detect and track platform motion in the absence of GPS capabilities, such as underwater or in space." Quantum sensing technology on board naval platforms would provide high-quality locational data without the need for periodic GPS updates, allowing the Navy to continue stealth operations in a GPS-denied environment. Beyond the clear navigational solutions it provides, quantum sensing could also be used for intelligence, surveillance, and reconnaissance (ISR) of foreign vessels. Quantum sensors that detect changes in the physical environment could "enable militaries to detect electromagnetic emissions . . . enhancing electronic warfare capabilities and potentially assisting in locating concealed adversary forces."

#### [Innovation Lab Hosts Modeling and Simulation Toolbox Hackathon](#)

*(NAVSEA 10 Feb 22)*

At the start of a cold Thursday in January, a group of more than 20 scientists and engineers from Naval Surface Warfare Center Dahlgren Division (NSWCDD) filed into the Innovation Lab, or iLab, for a day of learning and executing new skills. The NSWCDD innovators participated in the iLab's second Modeling and Simulation Toolbox (MAST) Hackathon Jan. 27... While the Dahlgren-created model supports analysis efforts, current naval warfighters receive exposure to the toolbox, which is currently in use with Valiant Shield exercises out in the Pacific, through wargaming exercises and research done at **Naval Postgraduate School** in Monterey, Calif.

#### [US Navy Prototypes, Files Patent on Stirling Engine for Liquid Air Energy Storage](#)

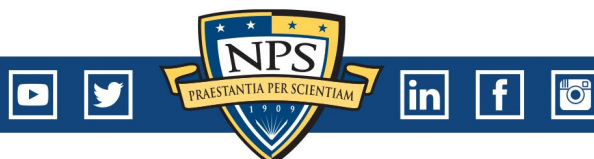
*(Tech Link Center 10 Feb 22)* ... Troy Carter

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#### [Microbial Fuel Cells on Seafloor Are Ready To Power Environmental Sensors](#)

*(Tech Link Center 11 Feb 22)* ... Troy Carter

Compact benthic microbial fuel cells have matured so much that the ocean's seafloor can now power networked environmental sensors, a new study has found, suggesting that the ocean food chain on which millions of people worldwide depend can now be studied constantly for years... At the **Naval Postgraduate School**, a professor built a microfluidic plate that shrinks the distances between the electrodes and the bacteria to increase electron capture efficiency.



## COLLABORATION:

### [Beam Global EV AR Selected for Autonomous Wildfire Fighting Exercise](#)

*(Yahoo! 9 Feb 22)*

Beam Global, (Nasdaq: BEEM, BEEMW), the leading provider of innovative sustainable technology for electric vehicle (EV) charging, outdoor media and energy security, announced that Project Vesta, an unmanned fire control prototype that combines state-of-the-art technology and Commercial Off The Shelf (COTS) equipment has selected the EV ARC™ off-grid solar-powered EV charging and emergency power system to provide a critical component of an innovative fire mitigation system that networks autonomous air and ground vehicles, solar charging capabilities, fire response equipment and communications. The Project Vesta goal is persistent fire surveillance and analytics capabilities enabled by edge computing and rapid interoperability... The event will be hosted February 14-18, 2022 by the Joint Interagency Field Experimentation (JIFX) 22-2 at Camp Roberts, CA. The organizations spearheading Project Vesta are NavalX SoCal Tech Bridge as part of the U.S. Marine Corps, JIFX as part of the **Naval Postgraduate School (NPS)** in Monterey, TESIAC with their Infrastructure as a Service (IaaS) offering and CANA Advisors. Public Private Partnerships (P3) demonstrate how collaboration between government agencies and private sector companies can target large-scale projects and problems to drive solutions faster and more effectively than when approached in silos.

### [Parallel Flight Technologies Selected to Participate in Autonomous Wildfire Mitigation Exercise](#)

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Parallel Flight Technologies, a leader in heavy-lift drone technology, announced its participation in the SoCal Tech Bridge's Project Vesta. The first experiment, hosted February 14-18, 2022, during the **Naval Postgraduate School's** Joint Interagency Field Experimentation (JIFX) 22-2 aboard Camp Roberts, CA, is a critical step in the evolution of faster, safer, and more effective wildfire control and mitigation.

## STUDENTS:

### [Reviewing The Strategy of Denial](#)

*(The Strategy Bridge 9 Feb 22) ... Kelley Jhong*

China's military posture toward Taiwan has been impossible to ignore, producing a flood of commentary about the sobering possibility of a Chinese invasion. Yet, other than generic recommendations of strengthening alliances and building military capabilities, there is a dearth of concrete proposals about how the U.S. should reshape its defense strategy, organizational structure, and force posture to address China's rise in the Indo-Pacific. Elbridge A. Colby endeavors to address this gap in *The Strategy of Denial: American Defense in an Age of Great Power Conflict*, outlining guiding principles and priorities that should inform U.S. defense policy in the region... Kelley Jhong is a U.S. Army officer and currently a candidate for an M.S. degree in Information Strategy and Political Warfare at the **Naval Postgraduate School**. The views expressed are the author's alone and do not reflect those of the U.S. Army, the Naval Postgraduate School, the Department of Defense, or the U.S. Government.

## ALUMNI:

### [Mike Franken Talks AG on Landus Cooperative Tour](#)

*(The Perry News 9 Feb 22) ... Jim Caufield*

U.S. Senate candidate and retired U.S. Navy Vice Admiral Michael Franken toured the Landus Cooperative in rural Perry Tuesday morning and discussed agricultural issues with about a dozen coop members... Franken, 64, hired on at Sioux Preme Packing Co. at 17 in order to pay for college, and he later worked as a bar manager, math tutor, bouncer and civil engineer in a law firm. He earned a bachelor's degree in engineering and a master's degree in physics at the **Naval Postgraduate School** and pursued professional studies at the Massachusetts Institute of Technology, the University of Virginia's Darden School of Business and the Brookings Institute...

### [Former Astronaut Winston Scott Next Simpkins Speaker](#)

*(Eastern Florida 9 Feb 22)*

Winston Scott has had a remarkable career that has taken him from the Miami of his youth to the stars — an inspirational journey he'll share at Eastern Florida State College as the next participant in the Simpkins Speaker Series... Scott earned a Bachelor's Degree in music education from FSU and his Master's Degree in aeronautical engineering from the United States **Naval Postgraduate School**.



## **Sedona Police Chief Completes Executive Leaders Program at Naval Postgraduate School**

*(Sedona Biz 10 Feb 22)*

Charles Husted, police chief of the Sedona Police Department, completed the Executive Leaders Program (ELP) at the **Naval Postgraduate School** Center for Homeland Defense and Security (NPS-CHDS) on Feb. 3, 2022.

## **Battle Of Submarines: World's Biggest Navy, Why China Could Be Ill-Prepared For A Deep-Sea Encounter With The US**

*(EurAsia Times 10 Feb 22)*

Under the AUKUS agreement, Australia is expected to build 8 nuclear attack submarines with American and British assistance, in part to counter China. Australia's SSNs when operational could become vital reinforcements to the 14 US SSNs in a potential conflict with China. However, China is not sitting idly and is getting ready to confront its adversaries... The author is an academic and diplomat from Timor Leste. He is a graduate of the S. Rajaratnam School of International Studies (RSIS) Nanyang Technological University (NTU), Singapore, the Chinese National Defense University, the U.S. **Naval Postgraduate School** and the American National Defense University.

### **UPCOMING NEWS & EVENTS:**

**Feb 21:** President's Day (**Federal Holiday**)

**Mar 7-9:** [Center for Executive Education LCSS Workshop](#)

**Feb 18:** [NWSI Strategic Deterrence Exploration Workshop](#)



## RESEARCH:

### The Quantum Future of Naval Warfare

(USNI 9 Feb 22) ... Lt. j.g. Lucian Rombado

As the tech Cold War intensifies with China and President Xi Jinping striving to establish the People's Liberation Army Navy (PLAN) as the dominant maritime power in the Indo-Pacific, the U.S. Navy faces a critical point: Achieve technological superiority for tomorrow's conflicts or surrender its competitive advantage to China. To visualize what falling behind in the race for technology entails, imagine this fictional news briefing set in the near future:

U.S. intelligence community officials reported this morning that the newly developed Chinese PLAN quantum computers have completed operational testing and have successfully demonstrated their ability to break military-grade encryption in the laboratory environment, severely degrading the confidentiality of top-secret communications across U.S. Navy platforms in the Indo-Pacific. At this afternoon's press briefing, the U.S. Secretary of Defense (SecDef) stated that the Department of Defense (DoD) is scrambling to partner with federal and civilian industry leaders to secure naval communications against these emerging quantum computing hacks. Analysts at the DoD expect China's quantum codebreaking systems to be fully deployable within three to five weeks, giving the DoD a very short window of time to devise a solution. This announcement comes just one week after the Chief of Naval Operations (CNO) issued a warning to U.S. Pacific Fleet Submarine Force leaders stating that Chinese Jin-class ballistic missile submarines have completed initial laboratory testing for quantum sensing technology, giving them unparalleled navigational accuracy without cumbersome periodic GPS calibration requirements. The U.S. Navy's Undersea Warfare Development Center is currently working with submarine force leadership to analyze the increased threat that China's new undersea quantum sensors pose to submarines operating in the Pacific. In last night's interview with the SecDef regarding the emerging Chinese quantum threat to national security, he stated, "We've been caught off guard, and it's an all-hands effort as we scramble to figure this out."

While this narrative may seem like science fiction, China's quantum computing research and development (R&D) is well underway, and the global race for quantum superiority has begun. This disruptive technology will transform military science and the way computers process data in a wartime environment. The CNO's recent 2021 Navigation Plan stresses that "we are engaged in a long-term competition [with] China . . . and we must be prepared to flawlessly execute our Navy's timeless roles of sea control and power projection. To preserve sea control and maintain a competitive edge in the Indo-Pacific amid rising Chinese aggression, the Navy must establish itself as a key player in the U.S. quantum technology community. To do so, the Navy should host operational testing on board its platforms in two critical areas: quantum cryptography and quantum sensing. The Navy's operational tests in a rugged field environment will provide valuable feedback to the engineers who design the technology. Ultimately, the Navy's role in the quantum development cycle will accelerate the process of transferring quantum technology from the laboratory to warfighting units.

### Quantum Computing and Cryptography

Quantum computing is part of the larger quantum technology movement, which is "an emerging field of physics and engineering [that uses] the properties of quantum effects—the interactions of molecules, atoms, and even smaller particles" to solve problems. By leveraging these quantum effects, quantum computers process information differently from classical computers. Classical computers process binary information in 1s and 0s, whereas quantum computers use "qubits." Instead of representing just 1 or 0, qubits can also exist in superposition, meaning that "they're both on and off at the same time, or somewhere on a spectrum between the two." With superposition, quantum computers can perform quick calculations by considering multiple potential outcomes instantaneously. Qubits also abide by the quantum principle of entanglement, meaning that "two members of a pair exist in a single quantum state [and] changing the state of one of the qubits will instantaneously change the state of the other one in a predictable way," thereby increasing its computational power. A quantum computer's use of qubits, and



therefore the principles of superposition and entanglement, allow it to perform computations much more quickly than everyday binary computers.

By leveraging the unusual behavior of qubits to improve computing power, quantum computers pose a new threat to traditional cryptography. The modern standards of cryptography, which rely mainly on large prime number calculations to protect data, will not withstand a quantum system's computational power. According to the Brookings Institution, "the need for unbreakable encryption is staring us in the face [and] with the development of quantum computers looming on the horizon, the integrity of encrypted data is at risk now." With quantum computers, a hacker could break military-grade encryption in a matter of minutes, compromising secure communications. The best defense against malicious hackers with quantum capabilities is quantum key distribution, which the Los Alamos National Laboratory deems "the most powerful data encryption scheme ever developed [and is] by all indications, virtually unbreakable."

China has already developed the "world's first integrated quantum communication network, combining over 700 optical fibers on the ground with two ground-to-satellite links to achieve quantum key distribution over a total distance of 4,600 kilometers for users across the country." By constructing this network, China has set the pace for creating secure quantum communications that cannot be intercepted or manipulated. Further advances in Chinese quantum communication networks, especially networks designed for military use, will put the Navy at increased risk when deployed to the Indo-Pacific. If Chinese communications are virtually unbreakable and U.S. Navy communications can be exploited by Chinese quantum code-breaking technology, it will quickly lose its ability to safely operate among PLAN forces. While efforts to develop quantum key distribution are well underway with organizations such as Oak Ridge National Laboratory, it will be a long road from the design phase to battle-tested field use. However, the Navy can help speed up this process by partnering with research organizations to set up a wireless quantum key distribution network across multiple naval platforms. After the equipment is installed across these platforms, quantum technology developers could test the network at sea. Running these operational tests at sea would not only put this quantum technology through a "toughness test" in a challenging maritime environment, but it would also help developers soon tailor quantum key distribution networks for naval usage.

While quantum cryptography will be critical for secure military communications, quantum sensing will provide new capabilities for both stealthy open-ocean navigation and intelligence collection on foreign vessel locations. Quantum sensing—the use of quantum properties to measure changes in the surrounding environment—offers promising solutions to the chronic naval dilemma: dependence on GPS for navigation at sea. The Navy's current dependence on GPS leaves platforms vulnerable to GPS-jamming while at sea. If a ship's GPS downlink was jammed by a malicious Chinese signal, it would be unable to navigate safely in the open ocean. Though naval platforms also use internal navigation systems, these lose accuracy over time and require periodic GPS downlinks to confirm the vessel's location.

Researchers at the **Naval Postgraduate School** are developing quantum sensing technology to "detect and track platform motion in the absence of GPS capabilities, such as underwater or in space." Quantum sensing technology on board naval platforms would provide high-quality locational data without the need for periodic GPS updates, allowing the Navy to continue stealth operations in a GPS-denied environment. Beyond the clear navigational solutions it provides, quantum sensing could also be used for intelligence, surveillance, and reconnaissance (ISR) of foreign vessels. Quantum sensors that detect changes in the physical environment could "enable militaries to detect electromagnetic emissions . . . enhancing electronic warfare capabilities and potentially assisting in locating concealed adversary forces."

Bringing quantum sensors to the fight would disrupt the traditional electronic warfare doctrine and provide increased situational awareness by revealing adversarial platform locations. Because most quantum sensing technology is tailored for national security use (unlike quantum cryptography, which offers immediate private sector benefits), the DoD must pick up the tab on this investment rather than rely on private industry to fund advancements in this technology. The Navy should take advantage of the research already completed at the Naval Postgraduate School and begin integrating this technology for operational testing at sea. To do this, the Navy should install rudimentary quantum sensors on board a submarine or surface ship and take this technology underway off the U.S. coast. Once underway, the



Navy could test the sensor’s navigational accuracy and ability to detect small changes in the electromagnetic environment for ISR purposes. The real-world data collected during these sea trials would provide direct feedback to engineers to improve performance at sea.

While quantum technology R&D is a challenging and expensive endeavor, the Navy must be an integral part of the national quantum technology effort. By hosting at-sea operational testing for U.S.-produced quantum technology, the Navy will stay in the loop on emerging developments and be well suited to integrate quantum technology across the fleet permanently.

Because China’s quantum technology R&D is state-driven and U.S. quantum development is inherently more “disparate [and] spread across dozens of funding agencies, universities and private companies,” DoD leaders must ensure the development and application of quantum technology for military use is efficient. Partnerships with quantum technology developers and operational testing on Navy platforms will be key to leveraging this technology across the DoD for years to come. A failure to keep pace with China in the race for quantum technology will leave the DoD vulnerable to a myriad of threats in the Indo-Pacific. This is a race the United States cannot lose.

[The Quantum Future of Naval Warfare | Proceedings - February 2022 Vol. 148/2/1,428 \(usni.org\)](#)

[Return to Index](#)

## **Innovation Lab Hosts Modeling and Simulation Toolbox Hackathon**

*(NAVSEA 10 Feb 22)*

At the start of a cold Thursday in January, a group of more than 20 scientists and engineers from Naval Surface Warfare Center Dahlgren Division (NSWCDD) filed into the Innovation Lab, or iLab, for a day of learning and executing new skills. The NSWCDD innovators participated in the iLab’s second Modeling and Simulation Toolbox (MAST) Hackathon Jan. 27.

“MAST is a tool that allows an analyst to create models by piecing together components to create whatever they want to make, whether it is a littoral combat ship, helicopter, sailor or platoon. They use building pieces to do that,” explained MAST Senior Software Architect Clinton Winfrey. “After parameterizing a platform, analysts add the weaponry, sensors, missile launchers, etc. that belong with that system. Analysts can create representations of capabilities that exist today or those that have yet to be developed.”

While the Dahlgren-created model supports analysis efforts, current naval warfighters receive exposure to the toolbox, which is currently in use with Valiant Shield exercises out in the Pacific, through wargaming exercises and research done at **Naval Postgraduate School** in Monterey, Calif.

“It’s a powerful instrument that can answer a lot of tough questions in a simple way. That’s the goal: to give people a capability that they don’t have already,” said Winfrey. “With a tool like MAST, analysts can answer ‘what if?’ questions and better understand what might occur in a situation that can’t easily be tested live.”

At the beginning of the event, participants engaged in a boot-camp to quickly learn the model, followed by implementing their newly-learned skills in three increasingly challenging scenarios.

“These hackathons are beneficial because they expose the workforce to a potential tool that is readily available and provide some hands-on experience,” said NSWCDD Force Analyst Josh Shiben. “We use MAST directly to derive some of the requirements for the future Navy’s needs. MAST is a really flexible tool. You don’t have to be a component programmer to use it – I’m not! It’s definitely useful in that regard.”

Seven teams of three participated in the events with each employee coming from a different program or project background, creating a space for unique perspectives on the scenarios to thrive.

“I like the interconnectivity of it all [the hackathon],” said David Barnes, a scientist from NSWCDD Dam Neck Activity. “If everyone on my home team was here working on these scenarios, we would get different results.”



During each of the three scenarios, members of the Warfare Analysis and Digital Modeling Department walked around the room to assist teams and review the scenario's results. For each scenario, teams were scored based on how effective their solution was to the problem, with respect to casualties and cost effectiveness.

"The three exercises are the same scenario with increasing difficulty. After every round, we score them on how well they did based on how many ships they got across the finish line," said Shibben. "The better they do and the cheaper they do it for, the higher the score. It's more like a track meet – they're not trying to kill each other, they're trying to run faster."

Ultimately, the team from the Electromagnetic and Sensor Systems Department outperformed the other teams, winning coveted bragging rights. Despite only one official 'winner,' each participant left with another tool in their toolboxes – the MAST model itself.

"All of the participants downloaded MAST. They can take back the lessons they have learned during the hackathon and go into the model and develop their own scenarios or apply them to scenarios for their department," said iLab Director Tamara Stuart.

Other areas of MAST that were not explored during the hackathon, such as its applications in other weapon realms, are available to the technical departments.

[Innovation Lab Hosts Modeling and Simulation Toolbox Hackathon > Naval Sea Systems Command > Saved News Module \(navy.mil\)](#)

[Return to Index](#)

## **US Navy Prototypes, Files Patent on Stirling Engine for Liquid Air Energy Storage**

*(Tech Link Center 10 Feb 22) ... Troy Carter*

The **Naval Postgraduate School** in Monterey, California, has filed for a 20-year utility patent on a recently modeled dual-Stirling engine recovery for Liquid Air Energy Storage systems.

The details of the patent application were first made public by the U.S. Patent and Trademark Office on Feb. 10, 2022.

This technology is early, but if established as an efficient storage system, enables large-scale storage of excess energy from intermittent electrical sources such as photovoltaic solar and wind-powered turbine generators without the problems associated with compressed air energy storage, a similar technology, or another known as pumped hydro, which uses excess energy to pump water uphill to a hydroelectric dam is needed.

"While having the advantages of hydro and compressed air, it is not geographically constrained or require large tanks. The first large-scale operational plant of this type was recently of this type opened in 2016 at the University of Birmingham, UK, and uses waste heat from a nearby landfill-gas powered generation facility to improve overall efficiency," according to the NPS patent application, which lists Nicholas Bailey, Christopher Girouard, and Anthony Pollman as the inventors.

In most Liquid Air Energy Storage systems, renewable or alternative energy, for example from rooftop solar panels, in excess of immediate demand, is wired to an industrial cooling system that turns air into a liquid, which is stored in tanks

When power is needed later, say at night, the liquified air is warmed with ambient air and its expansion powers a turbine generator power.

But the Navy, in this research and patent application, is proposing an alternative to turbine generation.

"When additional energy is needed, the Stirling engine can be started by turning the Stirling engine pulley wheel... The Stirling engine continues to work due to a temperature difference between the copper cold finger extension (in contact with the stored liquid air) and the ambient air temperature of the Stirling engine heat sink. The copper finger extends the cold side of the Sterling engine further into the dewar to improve performance, according to the application.



“The temperature difference causes pistons inside the Stirling engine to move thereby turning the Stirling engine pulley wheel... the pulley wheel, which is connected via pulley to the electric generator pulley wheel, spins the electric generator to produce electrical energy.”

Yeah, there are inefficiencies, but the prototype is epic.

“Utilizing the Stirling cycle and the temperature difference between the boiling point of liquid air and the ambient environment, energy generation was proven possible. Generation efficiency was calculated using both the calculated experimental energy densities observed and by comparing latent heat of vaporization for the cryogenic fuel versus observed energy output. While the prototype proved that the technology is feasibly possible, the efficiency was extremely low due to inefficiencies within the design, components, and experimental apparatus. Future improvements to the system lie in 40 isolating the subsystem from the environment to lessen the heat transfer from the environment and improve efficiency,” Bailey wrote in their thesis.

Effective use and integration of renewable energy sources, coupled with different storage options, is an emerging priority within the Department of Defense.

Now hit the button below to learn more about how private companies can license NPS patents and develop new technologies into commercially successful and environmentally important solutions.

[US Navy prototypes, files patent on Stirling engine for Liquid Air Energy Storage - TechLink | TechLink \(techlinkcenter.org\)](#)

[Return to Index](#)

## **Microbial Fuel Cells on Seafloor Are Ready To Power Environmental Sensors**

*(Tech Link Center 11 Feb 22) ... Troy Carter*

Compact benthic microbial fuel cells have matured so much that the ocean’s seafloor can now power networked environmental sensors, a new study has found, suggesting that the ocean food chain on which millions of people worldwide depend can now be studied constantly for years.

The latest findings are based on power production from three benthic fuel cells, one located in Yaquina Bay, Oregon in 2016, the second in St. Andrews Bay, Florida, in 2019.

The third fuel cell was located on the continental slope 40 miles off the coast of Yachats, Oregon, where it operated continuously for 1,045 days (from Aug. 2016 through Jan. 2019) at a depth of 580 meters.

The fuel cells harness the metabolism of marine bacteria living in the nutrient-rich seafloor. The bacteria colonize the cell’s anodes and transfer electrons to it. The energy is used to recharge lithium-ion batteries, which in turn can feed power-hungry sensors and transmitters.

The alternative is to hire divers to replace depleted batteries every few years at a cost, one study said, was approximately \$500,000 per station.

But with some engineering improvements, the current fuel cell technologies are ready to help monitor “ocean health, hazards, industry installations, and coastal security,” according to Clare Reimers, Distinguished Professor of Ocean Ecology and Biogeochemistry at Oregon State University and lead author of the study, which was published on Jan. 25 in the *Journal of Power Sources*.

“The seafloor is a vast mosaic of oceanic habitats that are sculpted by natural processes and impacted increasingly by anthropogenic activities connected to geological resource extraction, the global energy sector, buried communication cables, and the harvesting of marine organisms for food and income,” the article states.

Supportive funding for Reimer’s research was provided by the Office of Naval Research.

Several U.S. Navy research efforts have led to novel benthic microbial fuel cell designs and technologies.

At the **Naval Postgraduate School**, a professor built a microfluidic plate that shrinks the distances between the electrodes and the bacteria to increase electron capture efficiency.





Researchers at the U.S. Naval Information Warfare Center in San Diego have built a “Readily-Deployable Microbial Fuel Cell” and a “Linear Array Benthic Microbial Fuel Cell.”

And at the U.S. Naval Research Laboratory in Washington, D.C., scientists have built benthic unattended generators (BUG) to power environmental sensors in the Potomac River.

To see the incorporation of these innovations into products offered by the private sector the U.S. Navy is making these patented inventions available for license.

TechLink, the Navy’s technology transfer intermediary, is excited to offer no-cost licensing services to companies who want to take advantage of these technology transfer opportunities.

[Microbial Fuel Cells on Seafloor Are Ready To Power Environmental Sensors - TechLink | TechLink \(techlinkcenter.org\)](#)

[Return to Index](#)

## **COLLABORATION:**

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Beam Global, (Nasdaq: BEEM, BEEMW), the leading provider of innovative sustainable technology for electric vehicle (EV) charging, outdoor media and energy security, announced that Project Vesta, an unmanned fire control prototype that combines state-of-the art technology and Commercial Off The Shelf (COTS) equipment has selected the EV ARC™ off-grid solar-powered EV charging and emergency power system to provide a critical component of an innovative fire mitigation system that networks autonomous air and ground vehicles, solar charging capabilities, fire response equipment and communications. The Project Vesta goal is persistent fire surveillance and analytics capabilities enabled by edge computing and rapid interoperability.

“The Project Vesta team is excited to have Beam Global join this autonomous wildfire fighting experiment. Their engagement with the SoCal Tech Bridge continues to deepen as Marines and Sailors across several west coast bases have access to EV ARC systems,” said Captain Ben Cohen, U.S. Marine Corps. “To have Beam bring their expertise in providing vital off-grid alternative energy to the experiment is absolutely a win.”

The event will be hosted February 14-18, 2022 by the Joint Interagency Field Experimentation (JIFX) 22-2 at Camp Roberts, CA. The organizations spearheading Project Vesta are NavalX SoCal Tech Bridge as part of the U.S. Marine Corps, JIFX as part of the **Naval Postgraduate School** (NPS) in Monterrey, TESIAC with their Infrastructure as a Service (IaaS) offering and CANA Advisors. Public Private Partnerships (P3) demonstrate how collaboration between government agencies and private sector companies can target large-scale projects and problems to drive solutions faster and more effectively than when approached in silos.

“Wildfires cause profound loss of loss of life, property, commerce and natural resources, and they are increasing in frequency and severity,” said Desmond Wheatley, CEO of Beam Global. “We are proud to be an active participant in Project Vesta. The EV ARC transportable off-grid EV charging system will provide vital energy to drones and electric ground vehicles equipped to help manage and suppress fires. The EV ARC system requires no liquid fuels, it’s always running, and it does not create fire danger or pollution as a diesel or gasoline generator might.”

Project Vesta is a critical step in the evolution of faster, safer and more effective wildfire control and mitigation. Wildfires are a significant problem continually growing in severity and scope globally and especially in the California region. The threat to people, wildlife, natural and commercial resources, and the environment is profound and long-lasting. First responders committed to fighting fires face significant boots-on-the-ground peril and Project Vesta aims to accelerate the use of technology to detect fires sooner, deploy fire suppressing measures faster, and reduce the risk to human life.

[Beam Global EV ARC™ Selected for Autonomous Wildfire Fighting Exercise \(yahoo.com\)](#)



[Return to Index](#)

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*(MENA FN 10 Feb 22)*

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Wildfires are a wicked problem continually growing in severity and scope, especially in the California region. The threat to people, wildlife, natural and commercial resources, and the environment is profound and long-lasting. Those committed to fighting fires face significant challenges, and are left with little room for error, but much room for improvement. Supported by the Department of Defense, SoCal Tech Bridge is aiming to develop an uncrewed fire mitigation prototype that combines state-of-the-art technology and Commercial Off the Shelf (COTS) equipment to identify risk, reduce response time, and support mitigation efforts.

“Our core mission is to save lives, property, and the environment. With the development of our Parallel Hybrid drone technology, which combines extreme heavy lifting with long duration, our uncrewed, autonomous aircraft open new possibilities for the safety of first responders,” says Joshua Resnick, CEO of Parallel Flight Technologies. He continues, “Our UAS, Firefly, will provide the ability to enhance proactive prescribed burn capabilities for fire prevention, as well as crucial staging and tactical resupply of hoses, tools, fuel, food water, etc., for firefighting personnel on the front lines battling wildfires.”

TESIAC, a member of the Project Vesta leadership team, is pleased to work with Parallel Flight Technologies to develop solutions to aid in the detection and suppression of wildfires. The Project Vesta team will collaborate to experiment the integration of sophisticated and newly developed technologies, in concert with other firefighting assets. “Parallel Flight's contribution to meeting the challenge of wildfire control is an extremely important addition to the wildfire suppression tool kit”, said Karen Morgan, CEO of TESIAC.

The Project Vesta team is passionate about developing – and sharing – better, quicker, and safer means to address this challenging issue. The program goals are persistent fire surveillance, analytics capabilities enabled by edge computing, and rapid interoperability. If successful, it can support continuous terrain mapping, accurate fuel analysis, immediate fire identification, and the timely delivery of suppressant agents in active fires.

Parallel Flight's transformative UAS technology can be applied across multiple logistics verticals, including real-time and complex healthcare logistics, tactical support for firefighters and first responders, and industrial logistics. By serving as an original equipment manufacturer and service provider, Parallel Flight Technologies is well-positioned to revolutionize drones as a service (DAAS) on a global scale.

[Parallel Flight Technologies Selected to Participate in Auto... | MENAFN.COM](#)

[Return to Index](#)

## STUDENTS:

### Reviewing The Strategy of Denial

*(The Strategy Bridge 9 Feb 22)* ... Kelley Jhong

China's military posture toward Taiwan has been impossible to ignore, producing a flood of commentary about the sobering possibility of a Chinese invasion. Yet, other than generic



recommendations of strengthening alliances and building military capabilities, there is a dearth of concrete proposals about how the U.S. should reshape its defense strategy, organizational structure, and force posture to address China's rise in the Indo-Pacific. Elbridge A. Colby endeavors to address this gap in *The Strategy of Denial: American Defense in an Age of Great Power Conflict*, outlining guiding principles and priorities that should inform U.S. defense policy in the region.

Colby, a former Deputy Assistant Secretary of Defense for Strategy and Force Development and a leading official in the development of the 2018 National Defense Strategy, has the curriculum vitae to provide an authoritative reassessment of U.S. defense strategy. Anchored in theory and bolstered by historical references, the book provides valuable nuggets of information, but it stops short of being groundbreaking—particularly for readers who are already well abreast of Chinese affairs and the principles of strategy.

As the book's title indicates, Colby asserts that the best military strategy is a denial defense that seeks to prevent China from achieving regional hegemony in the Indo-Pacific. Colby avers that the U.S. should plan against China's "focused and sequential strategy," which he defines as an attempt to fracture the coalition by "sequentially isolating and subjugating enough vulnerable members" to cripple the coalition's credibility and compel disaffiliation. Specifically, he argues the U.S. should deny China's ability to seize and hold key territories within China's top three targets: Taiwan, the Philippines, and Vietnam.

#### THE STRENGTH AND RELATIVE NOVELTY OF COLBY'S BOOK COME FROM THE SPECIFICITY OF HIS RECOMMENDED PRIORITIES.

To make his case, Colby presents his arguments in a deductive manner, establishing a logical progression from theory to its application and recommendation. This methodology not only solidifies the foundational elements of his arguments, but it also ensures that any reader understands his assumptions and principles. Yet, for a reader who is already versed in basic international relations theory or military affairs, the slow build-up compounded with Colby's propensity to be repetitive may feel tedious. This repetitiveness, however, allows readers to selectively peruse the book.

The strength and relative novelty of Colby's book come from the specificity of his recommended priorities. He warns that continued ambiguity of the U.S. defense perimeter in the Indo-Pacific could be taken by China as a lack of resolve. Colby believes that the U.S. should clearly define which states are in or out of its perimeter based on its defensibility and the added benefit it brings to the anti-hegemonic coalition against China.

Colby considers Japan, Australia, and the Pacific islands as foundational to that perimeter because he concludes that they are defensible, capable, and important for power projection from the U.S. Pacific Coast. He also includes in that array Taiwan, the Philippines, and South Korea as critical states for any defensive coalition despite the vulnerabilities associated with their geographic proximity to China.

#### COLBY'S EXPLICIT PRIORITIZATION IS REFRESHING GIVEN THE UNWILLINGNESS OF OTHER COMMENTATORS TO ACCEPT A CLEAR LIMIT TO U.S. COMMITMENTS IN THE INDO-PACIFIC.

Colby prescribes an aggressive perimeter, but he takes a reasonably sober assessment of the value and defensibility of other states in the region. He concludes that Mongolia and Kyrgyzstan should not be retained in the defense perimeter given their minimal power and defensibility. Similarly, Colby views New Zealand, Sri Lanka, and Bangladesh as unlikely to make a major difference in the balance of power within the region given their limited power projection and their geographic position away from the "locus of competition." He also contends that an alliance partnership with India should not be deemed as essential despite its potential contribution, given India's natural opposition to Chinese domination and emphasis on autonomy. Colby's explicit prioritization is refreshing given the unwillingness of other commentators to accept a clear limit to U.S. commitments in the Indo-Pacific.

Regrettably, Colby often connects his arguments with banal assertions. He makes the self-evident observation that the U.S. should "identify China's best military strategies and plan its defense around them," while stating that the advancement of China's interests and regional hegemony would be features



of its best strategy. His discussion about the fundamental considerations for U.S. strategy are hardly more incisive.

The harder question—the one that Colby touches on but misses the opportunity to answer satisfactorily—is how to maintain resolve when the coalition is faced with tightening economic pressures, domestic turmoil, or disinformation. Colby reasonably assumes that anti-hegemonic resolve will likely strengthen as China increases its belligerence. However, it is less clear that such resolve could be sustained amongst a diverse set of states over a long period of time.

COLBY SEEKS TO NARROW THE SCOPE OF HIS BOOK AWAY FROM GRAND STRATEGY, BUT AN EXAMINATION OF THE INTERCONNECTEDNESS BETWEEN THE MILITARY AND OTHER ELEMENTS OF NATIONAL POWER IS REQUIRED TO FULLY UNDERSTAND CHINA’S STRATEGY AND BEGIN TO DEVELOP A REALISTIC, EFFECTIVE U.S. RESPONSE.

Furthermore, Colby assumes that China will continue its upward trajectory of overt military aggression, but this is far from a foregone conclusion. China’s historical and ideological context indicates a nuanced calculus focused on long-term strategies. China could continue to operate below the threshold of war through diplomatic or economic coercion, legal warfare, or information operations. Colby seeks to narrow the scope of his book away from grand strategy, but an examination of the interconnectedness between the military and other elements of national power is required to fully understand China’s strategy and begin to develop a realistic, effective U.S. response.

AFTER TAIWAN, CHINA MAY BE CONTENT WITH PROJECTING ITS POWER THROUGH MEANS OTHER THAN FORCE.

Colby is clear-eyed about the limitations of his proposed strategies, but his analysis of potential contingencies is shallow. He argues that in the event of a strategic failure in which China seizes and holds allied territory, the coalition should opt for a “binding strategy”—a deliberate effort to compel China to behave in a way that hardens the resolve of the U.S. and its allies and partners. Successful recapture of allied territory is contingent upon states’ willingness to take a costlier and riskier approach, which might manifest if China’s behavior presented a more malign threat. Yet, as Colby admits early in the book, effective application of compellence is extremely difficult. The enemy has a vote. After Taiwan, China may be content with projecting its power through means other than force. If this were the case, it would be difficult to create a perception that China is an existential threat.

Colby does not claim to do anything more than provide a “simplifying” logic for U.S. strategy toward China that would be accessible to American readers. His prolix approach, however, leaves the more well-versed reader itching to skip large sections of the book. Nonetheless, Colby should be commended for laying the foundations for an updated defense strategic framework and offering concrete proposals that are together a meaningful contribution to the conversation surrounding China’s alarming belligerence.

Kelley Jhong is a U.S. Army officer and currently a candidate for an M.S. degree in Information Strategy and Political Warfare at the **Naval Postgraduate School**. The views expressed are the author’s alone and do not reflect those of the U.S. Army, the Naval Postgraduate School, the Department of Defense, or the U.S. Government.

[#Reviewing The Strategy of Denial \(thestrategybridge.org\)](https://www.thestrategybridge.org/)

[Return to Index](#)



## ALUMNI:

### Mike Franken Talks AG on Landus Cooperative Tour

*(The Perry News 9 Feb 22) ... Jim Caufield*

U.S. Senate candidate and retired U.S. Navy Vice Admiral Michael Franken toured the Landus Cooperative in rural Perry Tuesday morning and discussed agricultural issues with about a dozen coop members.

Landus Cooperative Business Unit Lead Matt Brown led the tour. He was joined by several other Landus figures, including Vice President of External Affairs Molly Toot, Area Lead Steve Morman and Communications and Marketing Lead Mary Harrington.

Franken, a Sioux City Democrat who seeks his party's nomination to run against Republican U.S. Sen. Chuck Grassley in the November general election, grew up in his father's blacksmith and machine shop in Lebanon, Iowa, and knows farming best from the equipment side, he said.

Landus Cooperative has more than 70 grain, agronomy and feed locations in 26 Iowa and three Minnesota counties and is the seventh-largest grain company in North America based on storage capacity. Services at the Perry plant include retail agronomy, crop inputs and protection and storage for dry nitrogen fertilizer and liquid anhydrous ammonia.

Renewable fuels was one of the topics that cropped up in discussion, and Brent Halling of rural Perry mentioned the importance of Western Iowa Energy LLC, a 45-million-gallon biodiesel plant in Wall Lake.

"I see an energy grid in this state that is sustainable and includes biodiesel when solar and wind aren't enough," Franken said. He said there is potential for using biodiesel in aviation fuel and to power naval vessels and freighters, which are large emitters of greenhouse gases.

Franken, 64, hired on at Sioux Preme Packing Co. at 17 in order to pay for college, and he later worked as a bar manager, math tutor, bouncer and civil engineer in a law firm. He earned a bachelor's degree in engineering and a master's degree in physics at the **Naval Postgraduate School** and pursued professional studies at the Massachusetts Institute of Technology, the University of Virginia's Darden School of Business and the Brookings Institute.

He announced his candidacy for the Democratic nomination in October. He shares the field with fellow Democratic candidates Abby Finkenauer, Glenn Hurst and Bob Krause.

[Mike Franken talks ag on Landus Cooperative tour | ThePerryNews](#)

[Return to Index](#)

### Former Astronaut Winston Scott Next Simpkins Speaker

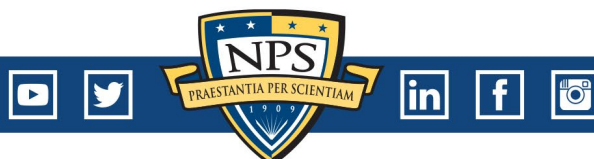
*(Eastern Florida 9 Feb 22)*

Winston Scott has had a remarkable career that has taken him from the Miami of his youth to the stars — an inspirational journey he'll share at Eastern Florida State College as the next participant in the Simpkins Speaker Series.

The event, which is free and open to students, college employees and the public, will be held March 1 at 9:30 a.m.

People can attend in-person on the Melbourne Campus in the Student Union, Bldg. 16, second floor or watch via livestream on the college's @easternflorida YouTube channel.

On-campus watch parties will also be held at these locations:  
Cocoa Campus, Bldg. 4, Simpkins Fine Arts Center, Auditorium  
Palm Bay Campus, Bldg. 1, Rm. 107G, Auditorium  
Titusville Campus, Bldg. 1, Rm. 120, Auditorium



Scott, of Melbourne, is a member of the EFSC Board of Trustees. He retired from his position as Senior Advisor to the President for External Relations at Florida Institute of Technology in April 2021 and currently serves as Faculty Emeritus.

He graduated from Florida State University and earned his wings as a Naval aviator in 1974. He flew the F-14 Tomcat and F-18 Super Hornet fighters and 20 other military and civilian aircraft, accumulating more than 5,000 hours of flight time and making over 200 shipboard landings.

He was selected as a NASA astronaut in 1992 and flew on two space shuttle missions in 1996 and 1997, logging more than 24 days in space and conducting three spacewalks with nearly 20 hours outside the spacecraft.

After leaving NASA, he served as Vice President of Student Affairs at Florida State University and Executive Director of the Florida Space Authority, where he helped open the space industry at Kennedy Space Center to commercial companies such as SpaceX and Blue Origin.

Scott earned a Bachelor's Degree in music education from FSU and his Master's Degree in aeronautical engineering from the United States **Naval Postgraduate School**.

The Simpkins Speaker Series is named after the late Bernard Simpkins, a highly successful entrepreneur and Brevard County business leader who established the sessions that have brought some of the nation's top business innovators to EFSC.

The series also includes the presentation of the Bernie W. Simpkins Scholarship to EFSC students with an entrepreneurial focus.

[Eastern Florida State College | Former Astronaut Winston Scott Next Simpkins Speaker](#)

[Return to Index](#)

## **Sedona Police Chief Completes Executive Leaders Program at Naval Postgraduate School**

*(Sedona Biz 10 Feb 22)*

Charles Husted, police chief of the Sedona Police Department, completed the Executive Leaders Program (ELP) at the **Naval Postgraduate School** Center for Homeland Defense and Security (NPS-CHDS) on Feb. 3, 2022.

Husted has served as the city's chief of police since April 2019. Under his leadership, the Police Department has adopted the motto "Selfless Service for ALL" and guiding foundational core values of "Community, Compassion and Honor." He has most recently been busy focusing on an updated Emergency Operations Plan and the development of a Community Emergency Preparedness Guide for the city of Sedona, all in collaboration with other city staff, community partners and regional public safety agencies.

During the 12-month program, Husted interfaced with homeland security officials from across the nation on current policy, strategy and organizational design challenges.

"I appreciate the opportunity to have connected with and learned from a broad spectrum of professionals who have dedicated their careers and expertise to better protecting our homeland from the perspective of both an internal and external lens," said Husted.

The NPS-CHDS students represent a snapshot of the homeland security enterprise, including professionals from the fields of emergency management, education, law enforcement, fire service, homeland security, public health and city/county government.

[Sedona police chief completes Executive Leaders Program at Naval Postgraduate School - Sedona.Biz - The Voice of Sedona and The Verde Valley](#)

[Return to Index](#)



## **Battle Of Submarines: World's Biggest Navy, Why China Could Be Ill-Prepared For A Deep-Sea Encounter With The US**

*(EurAsia Times 10 Feb 22)*

Under the AUKUS agreement, Australia is expected to build 8 nuclear attack submarines with American and British assistance, in part to counter China. Australia's SSNs when operational could become vital reinforcements to the 14 US SSNs in a potential conflict with China. However, China is not sitting idly and is getting ready to confront its adversaries.

With 80 submarines, the Peoples Liberation Army Navy (PLAN) has the highest proportion of submarines in relation to surface vessels than any other navy.

While the PLAN has about 67 conventionally powered subs, its nuclear attack submarine force remains rather small, at 6 ships. At a time when Australia is investing in nuclear attack submarines, China is focused elsewhere. Why is China not so enthusiastic about nuclear attack submarines, or at least for now?

### **Advantages Of Nuclear Submarines**

SSNs have several advantages over conventional subs, which are usually electric diesel-powered. Nuclear attack submarines are faster, can dive deeper and have larger ranges of operations. As such they are much harder to detect and destroy than conventional submarines.

However, such vessels are much more expensive, costing on average 3 times more than conventional submarines, and technologically complex to build and maintain. Still, the proponents for SSNs argue that nuclear submarines are superior to conventional ones and the costs are worth it.

In the past decade, advances in conventional submarine technology have called into question some of the past assumptions concerning the advantages of nuclear attack submarines. Modern conventionally powered submarines are being equipped with diesel-electric engines with more advanced batteries that increase their speed and range.

Air Independent Propulsion (AIP) technology has made conventional subs stealthier. While conventional submarines cannot match SSNs in terms of range and speed, their stealth capabilities do not lag far behind.

The United States only operates nuclear-powered submarines, separated from the rest of the world by two large oceans and with military bases spread across the globe. The US navy needs nuclear-powered submarines because of their limitless range. SSNs are also used to escort American aircraft carrier battle groups as they traverse the vast expanses of the world's oceans.

However, the PLAN's immediate priority is to prepare for a possible conflict with the US Navy over Taiwan or in regional waters such as the South China Sea. Therefore, the advantages of SSNs are at least for now not that relevant for China.

For the PLAN, the range of SSNs is not terribly important during a conflict over Taiwan, for it's the US Navy, which has to come all the way to meet the PLAN.

SSNs can dive deeper than conventional submarines. However, in the relatively shallow waters surrounding Taiwan and the South China Sea, such an advantage is questionable. When it comes to speed, modern conventional submarines can move quite fast within a small area of operations.

### **China's PLAN To Counter US Navy**

In a possible conflict over Taiwan, the 14 SSNs the US currently operates, not all deployed in the region, would have to get closer to the Chinese coast to support their surface fleet and hunt for Chinese submarines. As they get closer to the Chinese coast, the PLAN's numeric superiority in submarines will be an enormous challenge.

While the PLAN's submarine fleet will pose a formidable threat to the US Navy, its troubles are far from over. In recent years, China has been investing significant resources in advanced underwater sensors, sonar, and anti-submarine lasers technology to better identify and target US submarines.



The result is a growing “transparency” in the seas surrounding China. China’s ability to detect American submarines at great distances is improving by the day. China has deployed underwater sensors that allow it to monitor US submarine activity as far as Guam.

Last year, a Chinese underwater drone was washed off the Indonesian island of Selayar close to Northern Australia.

Anti-submarine mines have also received substantial attention from the PLAN and underwater drones to attack American submarines are under development. While these underwater drones seem to be in a developmental stage, the fact that China now has one of the most advanced drone industries in the world should worry the US.

Some analysts have gone as far as predicting that in the next two decades, anti-submarine warfare will be so advanced as to make the submarine redundant. While this remains to be seen, it is certain that new technologies are making submarine operations far more dangerous.

With their limitless range, Australia’s planned 8 SSNs could reach the waters around Taiwan fast and substantially reinforce American submarine forces. Once they reach their objective, it remains to be seen how useful they will be. The PLAN doesn’t seem to have any desire to fight a midway-type battle in the high seas.

China plans to fight the US and its allies closer to its shore where it has deployed thousands of missiles, drones, hundreds of modern fighters, advanced air defense systems, and where the waters are becoming “transparently” deadly by the day.

The author is an academic and diplomat from Timor Leste. He is a graduate of the S. Rajaratnam School of International Studies (RSIS) Nanyang Technological University (NTU), Singapore, the Chinese National Defense University, the U.S. **Naval Postgraduate School** and the American National Defense University.

[Battle Of Submarines: World's Biggest Navy, Why China Could Be Ill-Prepared For A Deep-Sea Encounter With The US \(eurasianimes.com\)](http://eurasianimes.com)

[Return to Index](#)

