

Empowering Student Ideas: NPS Introduces the Naval Innovation Exchange

MONTEREY, CALIFORNIA, USA, July 12, 2023 /EINPresswire.com/ -- The Naval Innovation Center (NIC) at the Naval Postgraduate School (NPS) in Monterey, Calif., is part of the Secretary of the Navy's initiative to leverage the power of American innovation for national security. Integral to the function of the NIC is the Naval Innovation Exchange (NIX), a new program that organizes and empowers multidisciplinary teams of NPS students and faculty focused on developing prototype research solutions.



The Naval Innovation Exchange (NIX) program at the Naval Postgraduate School (NPS) organizes and empowers teams of students and faculty with a focus on developing prototype research solutions.

While in its early stages, the NIC at NPS will leverage and empower NIX project teams, working with commercial industry partners, to address user-defined operational problems and accelerate capability enhancements that improve upon our existing systems and platforms.

Three initial NIX teams are pursuing technology concepts and workforce preparation efforts in Intelligent Autonomous Systems (IAS), Artificial Intelligence (AI) and Additive Manufacturing (AM). These and other future NIX teams will be aligned to critical defense technological needs and Force Design imperatives identified in the Chief of Naval Operations' Navigation Plan (CNO NAVPLAN).

Kaitie Penry, who recently assumed the new post of NPS Director of Research Innovation, and Dr. Kevin Smith, Vice Provost for Research, will oversee and coordinate the NIX portfolio being developed within the NPS Office of Research and Innovation (OR&I).

According to Penry, the NIX research "sprints" will prepare new technologies and practices for adoption into the Fleet, Fleet Marine Force and shore establishment. "Each team will be led by an NPS faculty member who will oversee student groups as they move the projects forward across

overlapping student terms while completing their graduate programs," she said.

Penry joined the NPS team in May 2023 from the National Security Innovation Network (NSIN), a program office within the Office of the Under Secretary of Defense for Research & Engineering. At NSIN, Penry was the Regional Engagement Principal for the greater San Francisco area, focusing on building relationships with early-stage startups and academia in order to develop novel solutions for national security problem sets. Prior to NSIN, Penry was a federal contractor for the Logistics Vision & Strategy office within Headquarters, Marine Corps.

"What I'm bringing to the NIX concept is that experience of having worked as a mission partner doing tech scouting, experiencing problems, and looking at the big operational space," said Penry. "I know how to generate and support a team as they work together to try and solve problems in a new and unique way."

Added Smith: "The goal of the program is to support students and faculty in addressing a problem from a holistic perspective. This is an effort to help advance technologies and processes to improve warfighting effectiveness and speed the development of capabilities towards adoption. We were fortunate to bring onboard a terrific leader, Kaitie Penry, to help stand up the NIX effort."

NIX teams will rely on NPS partnerships with laboratories and warfare centers through the Naval Research and Development Establishment (NR&DE), academia, and private industry to bring the best in their fields to the development of warfighting solutions.

The NIX program connects to the innovation pipeline at NPS, which begins with either the annual Warfare Innovation Continuum (WIC) or a specialized Warfare Innovation Workshop (WIW). NIX teams are formed around ideas and concepts emerging from the WIC/WIW. The hands-on experiential learning for students in the NIX program leverages their operational experience in an academic environment to develop threat-informed solutions with faculty experts and industry innovators.

NIX teams also drive ideation and prototyping through thorough testing and evaluation. Minimum viable solutions that show promise to meet a capability requirement advance to the next phase in the pipeline to become Innovation Capstone Projects, led by Department of Defense Management (DDM) students who develop acquisition strategies and transition plans for Program Executive Offices to adopt. Each phase of the NPS innovation pipeline represents a pivotal aspect of the process where experience, expertise, scholarship and research all contribute.

Dr. Sean Kragelund, Research Assistant Professor in the Mechanical and Aerospace Engineering Department, is heading the IAS NIX team. While his work with the Consortium for Robotics and Unmanned Systems Education and Research (CRUSER) has focused on this field of research for years, he is welcoming the transition to more collaborative work and defined project outcomes.

“NIX teams are part of an intentional effort by NPS to adopt this innovation mindset – to find new ideas and make an impact more quickly,” explained Kragelund. “Many good ideas have been invented at NPS, but they can sit unused on a shelf without a sponsor. When things are invented in a silo, they lack a connection to external research efforts and an operational narrative. Despite hard work and good relationships between students and faculty, it’s only when we bring the fleet, sponsors and industry into the mix that good ideas gain traction to transition. The NIX teams will do that.”

Kragelund kickstarted the IAS NIX team with a workshop on June 8-9, 2023, on the heels of the latest AI Summit at NPS hosted with the Office of Naval Research (ONR) and the Navy AI Task Forces. The event welcomed a mixture of students, faculty, active-duty members and DOD personnel and contractors to pinpoint ideal research topics related to IAS and “hybrid force” requirements.

The IAS Workshop was supported by the Naval Warfare Studies Institute (NWSI) at NPS, which works as a liaison with the Fleet to help curate problems and source them into the innovation pipeline. Through NWSI, Cecilia Panella, a Defense Analysis Faculty Associate for Research, organized the IAS workshop and is deeply involved in the innovation conversation.

“The military cannot buy talent. It has to grow it,” said Panella. “So the IAS Workshop and related events are such a valuable asset because we’re bringing together a community of researchers, contractors, and warfighters, and putting the students at the front and center. That’s what NPS is about.”

The IAS team is looking to partner with members of Task Force 59 who have done extensive IAS testing in the Middle East, as well as the Navy’s Unmanned Task Force. They will also have support from industry experts that partner with NPS through more than 40 active Cooperative Research and Development Agreements (CRADAs).

Other NIX teams are following a similar plan of attack. Dr. Mathias Kolsch, Associate Professor in the Computer Science Department who heads the AI NIX team, realizes his mission is to move research concepts from idea to impact.

“The AI NIX team is sponsored by ONR to accelerate the adoption of AI. And, of course, there is collaborative synergy with the IAS NIX team,” said Kolsch. “We can have the broadest impact if we identify and remedy gaps in projects that benefit from AI and machine learning technology, ensure that a capable and agile workforce can act on innovations in a well-informed and well-supported fashion, and if we learn about and disseminate information about the key ingredients to successful outcomes of AI projects.”

Kolsch added, “We are well positioned at NPS through our close relationship with operational commands, headquarters, joint efforts – particularly at the Chief Digital and Artificial Intelligence

Office (CDAO), through our students and their recent experiences, and the faculty's technical expertise. We plan on a productive information exchange with the IAS team and all future NIX teams to leverage collaborative synergies and to share our knowledge of how to unlock the potential of innovative AI applications."

The third NIX team is focused on Additive Manufacturing, targeting solutions to supply chain needs in the maritime domain and contested logistics. With the support of the Consortium for Additive Manufacturing Research and Education (CAMRE) at NPS, Dr. Emre Gunduz, Associate Professor in Mechanical and Aerospace Engineering and the technical co-director for CAMRE is leading the AM NIX team efforts to apply emerging AM technologies.

"Additive manufacturing will significantly impact the way DON conducts its operations, to rapidly overcome challenges in production and maintenance of its assets," said Gunduz. "We have been educating our students to be able to effectively use these approaches through our curriculum, and we can do more to empower them and their ideas with advanced facilities and closer collaboration within the naval research community, the fleet and across the DOD to fully realize their potential to make a difference and impact."

The AM NIX team, in conjunction with CAMRE, will participate in the Trident Warrior Exercise in the summer of 2024 in the Pacific to test solutions and address challenges in operational conditions using new AM technologies.

A goal of each NIX team is to reach a prototype state for a selection of its projects and develop a pathway to adoption. Teams have a variety of field experimentation programs to test and refine prototypes, such as the quarterly Joint Interagency Field Experimentation (JIFX) events with access to the NPS Beach Lab or Camp Roberts, which offers unrestricted ranges and airspace.

One of Kragelund's teams has already connected with an industry partner and is moving in this direction. "I have a group of students that I'm co-advising who are interested in unmanned surface vessels for a specific naval mission, and we recently signed a CRADA with a small tech startup to test the application," said Kragelund.

As part of the process, Kragelund met with Ray Jones, Chair of the Department of Defense Management, and offered to partner his engineering students with Jones' acquisition innovation capstone students. "It was a perfect match, and now they're sprinting together down the road," he added.

The resulting ICP team – U.S. Navy Lt. Cmdr. Hans Lauzen and Lt. Austin Dumas and U.S. Marine Corps Capt. Daniel Lim – is not only seeing success through their partnership, but also experiencing the holistic perspective that Smith originally envisioned.

"We've been able to tackle such a large scope by having this multidisciplinary team," said Dumas of his ICP trio. "Typically, you get a depth of knowledge in a certain area during a graduate

degree. But by doing this together as a team, we are constantly sharing the different components that we're working on and learning about each other's fields and areas of expertise. I've gotten such a broader education already, and I'm excited to see what the next year brings."

The team will utilize the upcoming JIFX event as a testing ground for their project, with plans to further test their work at a large-scale fleet exercise this August, as well as a U.S. Pacific Fleet integrated battle problem in February. Their ambitious goals and dedicated efforts are aimed to implement the new capability on an operational unit by the end of the next academic year.

"At some level, every student here at NPS is looking for something operationally relevant to research, and wants to make a difference," said Kragelund. "As faculty, we want to expose our students to possibilities, give them the tools they need through advanced coursework, good facilities, and industry partnerships to do relevant applied research, and then just get out of their way! They are mission-oriented and get things done."

Innovation driven, NPS develops warfighters and warfighting solutions. NPS delivers defense-focused graduate education, including classified studies and interdisciplinary research, to advance the operational effectiveness, technological leadership and warfighting advantage of the Naval service.

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