NPS Lab Tours are an opportunity for Topic Sponsors to gain a more in depth understanding of the specific research lab capabilities at NPS. Sponsors should be prepared for a 25-55 minutes tour length. The NRP will be hosting NPS Lab Tours on the 18th and 20th of April. When you register for NRWG 17 you will be asked to select one attendee registration type and to select multiple lab tours to create a schedule of tours that you would like to attend. Seventeen unique tours are scheduled for Tuesday and nine (three unique and six repeating) tours are scheduled on Thursday. Please carefully review the schedule of tours and select those that you would like to attend.

- Tours are scheduled in 25 or 55 minutes blocks
- Some tours overlap the start-time of another tour.
- Once you have mapped out your desired tour schedule and verified that you have not double-booked yourself, please sign-up for the tours by selecting the appropriate tour tickets at the time of your registration through Eventbrite.

NPS Naval Research Program - Naval Research Working Group Meeting 17 Lab Tour Schedule

Time	TUESDAY 18, APRIL		TIME	THURSDAY 20, APRIL		Time
0700	Topic Sponsor Sync Session (Herrmann Hall - EBC)					0700
0730						0730
0800						0800
0830						0830
0900	MOVES Live, Virtual & Constructive Lab	Center for Network Innovation & Experimentation		Sensor Research Lab	MOVES Additive Manufacturing Lab	0900
0930				Undersea Sensing Systems Lab		0930
1000	MOVES Eye Tracking & Virtual Reality Labs	Virtualization/Cloud Computing & Coalition for Open-Source DA Lab		Remote Sensing Lab	Global ECCO Gaming Lab	1000
1030		SAVAGE Lab			Human Systems Integration Lab	1030
1100	Material Characterization Facilities	Autonomous Systems Engineering & Integration Lab		Localization & Network Optimization Lab	Propulsion Lab	1100
1130	Microsystems Fabrication Lab	Systems Engineering Educational Labs		Engineering Enclave Maritime Security		1130
1200	Lunch Break			Lunch Break		1200
1230	Global ECCO Gaming Lab	NPS Warfare Innovation Continuum				1230
1300	Human Systems Integration Lab			Topic Sponsor Outbrief & Hotwash (Herrmann Hall - EBC)		1300
1330	Kartalov Lab	Undersea Sensing Systems Lab				1330
1400	Remote Sensing Lab	Sensor Research Lab				1400
1430	Break					1430
1500	Keynote Speakers (All hands in King Hall)			No-host Social (Herrmann Hall - Trident Room)		1500
1530						1530
1600						1600
1630						1630
1700	Break					1700
1730	Poster Session & Social (Herrmann Hall - McNitt Ballroom)					1730
1800						1800
1830						1830
1900						1900
1930						1930

In-Progress Reviews (IPRs) scheduled as necessary between Topic Sponsors, faculty, and students

KEY:

Bullard Hall
Glasgow Hall
Root Hall
Spanagel
Watkins Hall
Golf Course Annex
King Hall
Herrmann Hall

Tuesday, 18 APR

➢ 0900-0955

0900-0955 - Watkins Hall - Room 212B	**(20)**
Mr. Perry McDowell and Mr. Erik Johnson	

MOVES Live, Virtual and Constructive Lab (LVC)

LVC Operational tool: LVC systems brings together LVC (Live/Virtual/Constructive) components in a tool to improve the Marine Corps Planning Process. By allowing planners to create their plans in an easy to use software tool which provides information not normally available with current planning tools. Additionally, the plan is automatically run multiple times by constructive simulations rather than humans for a more robust and reliable evaluation of the plan's viability, and the output is displayed in a realistic virtual environment. Swarm Commander Tactics: A DARPA funded research project designed to develop offensive and defensive tactics utilizing swarms of unmanned air vehicles. This project is a multi-player PC-based competition gaming environment simulating hundreds of UAVs in air-to-air battles.

0900-0955 - Root Hall - Room 202	**(10)**
Dr. Alexander Bordetsky	

Center for Network Innovation and Experimentation (CENETIX)

CENETIX integrates and manages a unique student-operated NPS Tactical Networking and MIO Testbed. Together with international partners, the Center operates a globally distributed testbed environment to study tactical self-organizing networks and network enabled operations.

➢ 1000-1055

1000-1055 – Watkins Hall – Room 212A	**(10)**
Dr. Amela Sadagic, Mr. Perry McDowell,	
Maj John Gibson USMC, Capt Nicholas Arthur USMC, Sqn Ldr Faisal Rashid PAF and Mr. Cervando Bunuelos	

Moves Eye Tracking and Virtual Reality Labs

Current Projects/Demos: Shiphandling eye tracking research, HMLA Close Air Support Procedural Trainer for Situational Awareness; Proof-of-concept Part-task Trainer to Enhance Situational Awareness for Instrument Approach Procedures in Aviation Domain; Use of VR technology and Passive Haptics for MANPADS Training System; and HIVE Trainer: Developing a High-Radiation Immersive Virtual Environment Trainer for Nuclear Naval Propulsion Support Activity Training.

1000-1025 - Root Hall – Room 204A **(12)**
Dr. T. Warren Camber and Mr. Albert Barreto III

Virtualization and Cloud Computing Lab & The Coalition for Open-Source Defense Analysis (CODA)
This lab support a robust virtualized infrastructure which is used in teaching and research by both Information Science (IS) and Defense Analysis (DA) faculty, and students. The hardware, software, and data sets in this environment supports thesis research and directed study groups working on forensic analysis, White-Hat hacking, and other cyber focused topics. Collocated are a traditional HADOOP Big-Data cluster and a unique In-Memory computational platform of NPS design, both of which are used to support courses and research in Big Data, SNA, Link Analysis, MDA, and others. Current projects include architecting a hybrid architecture which will allow these two systems to process various disparate data types, including high-velocity and high-volume streaming data using horizontal and parallel processing as required.

1030-1055 - Watkins Hall – Room 267 **(20)**
Dr. Don Brutzman

Scenario Authoring and Visualization for Advanced Graphical Environments (SAVAGE) Lab
Naval forces do not have to be engaged in constant centralized communication, especially for littoral operations and unmanned systems. Network-optional warfare (NOW) can be achieved through efficient communications, signaling stealth, and semantic coherence for deliberate tactical messaging. Demonstrations include QR Code data transmissions. https://wiki.nps.edu/display/NOW/Network+Optional+Warfare

➢ 1100-1155

1100-1125 – Watkins Hall – Room 228E, 237 and 238 **(10)**
Dr. Claudia Luhrs

Material Characterization Facilities
Scanning and transmission electron microscopes, X-ray diffraction, thermal analysis and mechanical testing labs.

1100-1125 - Bullard Hall - Room 212E **(10)**
Mr. Rushen Dal

Autonomous Systems Engineering and Integration Lab
The Autonomous Systems Engineering and Integration Laboratory at the Systems Engineering (SE) department serves both educational and research purposes. On the educational side it hosts a variety of state-of-the-art experiments supporting the control, robotics, and autonomous systems related courses offered by the departments of Mechanical and Aerospace Engineering (MAE), Electrical and Computer Engineering (ECE), and SE. On the research side it complements the educational equipment manufactured by Quanser, Inc. with several robotic systems by the same company. These systems include indoor Q-bot ground vehicles and Q-ball quadcopters, used by students to prototype missions for future unmanned and autonomous systems, develop guidance navigation and control algorithms for them, address sensor integration issues, assess novel capabilities and technological gaps. ASEIL also operates a fleet of outdoor ground and aerial vehicles, some of which will also be demonstrated during the tour. https://my.nps.edu/web/gseas-dcl/advanced-experiments/

1130-1155 – Watkins Hall – Room 214 (5)
Dr. Dragoslav Grbovic

Microsystems Fabrication Lab
A Nano/MEMS Cleanroom lab used for silicon-based microsystems. Processes available range from photolithography, thin film deposition, etching to characterization and measurements. It features instruments for reactive ion etching, deep reactive ion etching, carbon nanotube growth, metal evaporation and optical and contact profilometry. https://my.nps.edu/web/physics/grbovic/

1130-1155 - Bullard Hall – Room 201K (16)
Mr. Albert Jordan

Systems Engineering Educational Labs
Systems Engineering Department labs support SE student research and instruction by providing the equipment, tools and software necessary for the design, fabrication and testing of systems spanning a wide variety of disciplines, including software, mechanical, electrical, controls, optical, chemical and biological.

➢ 1230-1325

1230-1255 – Root Hall – Room 113 (20)
Dr. Michael Freeman

Global Education Community Collaboration Online (Global ECCO) Gaming Lab
The Combating Terrorism Fellowship Program's (CTFP) sponsored Global ECCO (GE) platform has been a leader in the development of online, multiplayer, strategic games. GE has developed twelve games that have been utilized in partnership with several USG schoolhouses that integrate these games into their curricula. GE games focus on combatting terrorism themes such as asymmetric warfare, counter finance, countering violent extremism and social network analysis. The game styles range from online board games to immersive virtual reality exercises.

1230-1325 – Glasgow Hall – Room 128 (25)
Mr. Jeffrey Kline

Warfare Innovation Continuum
This presentation provides an overview of NPS Operations Research programs in developing and advancing naval concepts and tactics through wargaming, red teaming, simulation and campaign analysis. Methods to provide quantitative military assessments and risk assessments of new technologies and concepts of employment for those technologies will be discussed. If your interest lay with advancing and assessing warfighting capabilities this will be a presentation to attend.

1300-1325 – Glasgow Hall – Room 221 **(10)**
Dr. Nita Shattuck

Human Systems Integration (HSI) Lab
The HSI lab is a multi-use, configurable lab designed to measure individual, team and system performance. It has a variety of capabilities that include a team performance lab, usability analysis and eye-tracking, ergonomic and anthropometric measurement, fatigue and crew endurance tools for lab and field data collection, human modeling to include workload and task load of individuals and crews, motion capture, visual and auditory perception, reaction time and decision-making, and tools for designing physical layout of work and living spaces.

➤ **1330-1425**

1330-1355 – Spanagel Hall – Room 011 **(15)**
Dr. Emil Kartalov

Kartalov Lab
An applied physics lab with capabilities in microfluidics, micro fabrication, fluorescence microscopy, and biotech. Current projects include research into new insulation material based on microspheres to be used for diver suits, and an implantable nitrogen sensor to help avoid caisson disease (the bends) for divers.

1330-1355 – Spanagel Hall – Room 035 and 038 **(10)**
Dr. Kevin Smith

Undersea Sensing Systems Lab
This lab contains several UUV gliders and two Liquid Robotics Wave Gliders, along with various oceanographic and acoustic sensors, including advanced acoustic vector sensors, and acoustic modems. Research conducted in this lab involves studies of networking between autonomous systems, improved tracking and navigation of submerged systems, environmental remote sensing, and employing advanced acoustic sensors for detecting and tracking underwater targets of interest, including marine mammals.

1400-1425 – Spanagel Hall – Room 013 **(10)**
Dr. Richard Olsen and Mr. Jeremy Metcalf

Remote Sensing Lab
3D imaging technology using Laser scanners and 3D imaging with passive optical systems. Demonstration with terrestrial laser scanner and static display of UAV with infrared camera. http://www.nps.edu/rsc/

1400-1425 – Spanagel Hall – Room 003 **(10)**
Gamani Karunasiri and Fabio Alves

Sensor Research Lab
This lab is used to conduct research on novel sensors for potential military applications. Current research includes bio-inspired directional sound sensor for sniper fire detection and terahertz (THz) imager for detection of concealed objects. https://my.nps.edu/web/physics/karunasiri/

Thursday, 20 APR

➢ **0900-0955**

0900-0955 - Watkins Hall – Room 267 **(20)**
Dr. Amela Sadagic and Dr. Don Brutzman

MOVES Additive Manufacturing Lab
Shared 3D visualization over the Web can help Navy and Marine personnel worldwide, enabling better insight, increased velocity of learning, and knowledge sharing through real-time group collaboration. Demonstrations include the prototype Navy X3D Model Exchange under construction by NPS. Current Projects/Demos: CAD Interoperability for Navy Reuse in 3D Printing, Maintenance and Training; Additive Manufacturing: Technical Issues and Test of Large Scale Adoption in Naval Domain; and X3D Model Data Strategy for Navy Additive Manufacturing Digital Thread. Additive manufacturing (AM), 3D printing and 3D scanning can utilize the Extensible 3D (X3D) Graphics International Standard for mashups, interoperability and re-use.
https://wiki.nps.edu/display/ADDM/Additive+Manufacturing

0900-0925 – Spanagel Hall – Room 003 **(10)**
Gamani Karunasiri and Fabio Alves

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➢ 1000-1055

1000-1025 – Spanagel Hall – Room 013 (10)
Dr. Richard Olsen and Mr. Jeremy Metcalf

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1030-11:25 – Spanagel Hall – Room 219 (7)
Dr. Weilian Su, ENS Kathleen Heinbach USN and ENS James Mcmasters USN

Localization & Network Optimization Lab
The lab is being used to investigate techniques in localizing targets. One type of signal of interest is OFDM signal, which is used in LTE and wireless networks. In addition, we evaluate target location using two sensors. At the same time, the lab is investigating UAVs to form a network that can extend the range of off-shore network as well as enable cyber capabilities. This network is being research to connect back to the ship or other basestation using Cubesats as an alternative backbone. Fundamental research is being carried out such as network protocols for autonomous network configuration and connection as well as laser communication for high data transmission and low probability of intercept. To enable fast processing, the lab is developing tools and system architecture to process data using openCL that can be ported to FPGAs and GPUs. In addition, vulnerabilities in SCADA/ICS system are also being investigated.

1030-1055 – Glasgow Hall – Room 221 (10)
Dr. Nita Shattuck

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The HSI lab is a multi-use, configurable lab designed to measure individual, team and system performance. It has a variety of capabilities that include a team performance lab, usability analysis and eye-tracking, ergonomic and anthropometric measurement, fatigue and crew endurance tools for lab and field data collection, human modeling to include workload and task load of individuals and crews, motion capture, visual and auditory perception, reaction time and decision-making, and tools for designing physical layout of work and living spaces.

➢ **1100-1155**

1100-1155 - Golf Course Annex – Bldg 217	**(10)**
Dr. Christopher Brophy	

Propulsion Lab

The tour will introduce the attendees to the ongoing Missile Demonstrator launch vehicle effort and Rotating Detonation Engines experimental testing. Attendees will be able to inspect the experimental hardware and view a live fire of such an engine (if desired). Additional research ongoing at the lab will be discussed briefly.

1130-1155 - Spanagel – Room 300	**(8)**
CDR Zac Staples and LT Josh Heaney	

Engineering Enclave Maritime Security (EEMS)

Creating the infrastructure to study the complex behavior in maritime systems. The Engineering Enclave for Maritime Security (EEMS) will provide the Navy with something unavailable anywhere else, insight into the control systems that make global trade possible. One of the largest economic movements of the last century was globalization, which is entirely dependent on the safe navigation of enormous vessels as they traverse the world's oceans delivering goods. In turn, these vessels are critically dependent on computer aided systems that keep them in communication with the shore, chart their course around the globe, and control their engineering systems. A map of the cyber terrain where global trade could be the most vulnerable. EEMS will be used to build an engineering enclave to study the architectures, components, protocols, firmware, and processors that underpin global trade.