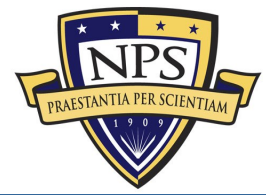




SYSTEMS ENGINEERING DEPARTMENT

NAVAL POSTGRADUATE SCHOOL



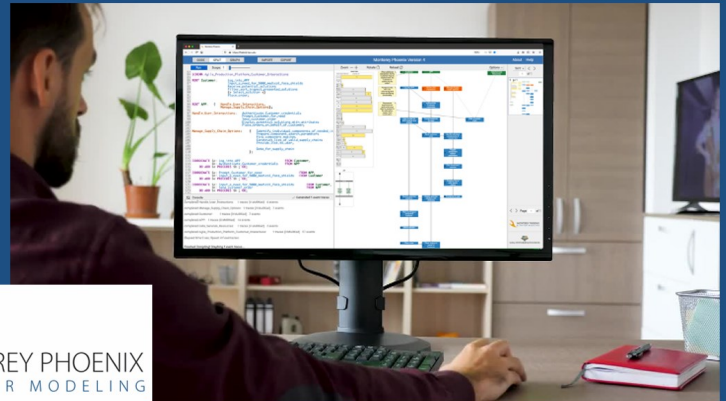
SYSTEMS ENGINEERING NEWSLETTER

October 2022

In This Issue:

- SE Spotlight
- Faculty News
- Student Stories
- Summer Quarter Awards and Graduations

Your system or process may be primed to behave in ways you never imagined or intended. Find and fix unexpected behaviors lurking in your design with Monterey Phoenix (MP), a user-friendly, NPS-developed language, approach and tool for modeling and reasoning about behavior.



<https://nps.edu/mp>

Letter from the Chairman

Welcome to the Systems Engineering Newsletter for the summer quarter of the 2022 Academic Year!

This quarter we continued to operate in the in-person mode and had a full-fledged graduation with students, their families (including many children), faculty, staff, and guests attending the summer commencement ceremony at King Hall on September 23rd. The commencement address was given by the Honorable Robert Work, Former U.S. Deputy Secretary of Defense. As usual, two days before graduation, the SE department held the hybrid Student Celebration Ceremony.

This time, out of 247 students campus-wide, the SE Department graduated 63 students (26%): 23 with the Master of Science in Systems Engineering, 3 - Master of Science in Systems Engineering Analysis, 1 - Master of Science in Engineering Systems, and 36 - Master of Science in Systems Engineering Management.

Eight students graduated with distinction, five students and one capstone cohort were recognized for their outstanding thesis/capstones. Assistant Professor Douglas Van Bossuyt won an annual Richard W. Hamming Teaching Award.

In the summer quarter, SE faculty delivered 28 resident and DL sections, advised 16 capstone project teams, continued advising M.S. and Ph.D. thesis students, served on a variety of departmental and schoolwide committees, and worked on the reimbursable research projects. To this end, SE faculty continued to actively participate in the Naval Research Program securing funding for 11 FY23 projects sponsored by the Navy and Marine Corps (in total, 95 out of 188 research proposals submitted in response to 268 Fleet research topics were selected to be funded).

This summer, SE welcomed two new participants of the Engineer and Scientist Exchange Program that promotes international cooperation in military research, development, testing and evaluation communities through the exchange of practical experience of defense engineers and scientists: Mr. Per Gisle Dalsjø of Norwegian Defense Research Establishment (FFI), and Ms. Youn Jung Park of Korean Agency for Defense Development (ADD).

The summer quarter concluded with a celebration of the SE department's 20th Anniversary. It is because the hard work of staff and faculty, our department established itself at NPS, grew, and have exhibited an exemplary performance throughout the past two decades. I would like to conclude with thanking every past and current member of the SE department for your contributions and congratulating our summer graduates and their families yet again! Well done!



Systems Engineering Chairman
Dr. Oleg Yakimenko

The systems Engineering Department Celebrates its 20th Anniversary

The Naval Postgraduate School's Systems Engineering Department recently celebrated the 20th anniversary of the department's founding. Faculty, staff, and friends joined together to celebrate the momentous anniversary at the Bayonet Grill at the Bayonet and Black Horse Golf Course nearby to the NPS campus. Prof. Joe Sweeney organized the surf and turf buffet and the venue that was enjoyed by all. Several recently retired or soon to retire faculty joined the celebration including Matt Boensel and Barbera Berlitz were in attendance.

Prof. Mike Green provided commentary on the founding of the department and the first ten years of the department's history. Dr. Ron Giachetti discussed the middle years of the department and its growth and expansion. Dr. Oleg Yakimenko described the recent history of the department and stated a vision for the future of the department. After dinner, a celebratory cake was cut, and everyone enjoyed systems engineering comradery as the sun set over Monterey Peninsula and the stars came out over Monterey Bay.

If you have remembrances of the Systems Engineering Department that you would like to share, please contact Chi-aki Gayle csgayle@nps.edu



First row from left: Dr. Bonnie Johnson, Prof. Mike Green

Second row from left: Dr. Douglas L. Van Bossuyt, Dr. Wally Owen, Dr. Joe Klamo, Dr. Rama Gehris, Prof. Barbera Berlitz, Prof. Mark Stevens, Mr. Ross Eldred

Third row from left: Dr. Fotis Papoulias, Prof. Joe Sweeney, Dr. Joel Hagan, Dr. Oleg Yakimenko, Dr. Andy Hernandez, Dr. Ron Giachetti, Prof. Matt Boensel, Dr. Gene Paulo



SE Spotlight

Systems Engineering Professor Receives the Richard W. Hamming Teaching Award

Dr. Douglas L. Van Bossuyt was recently recognized for his contributions to student success inside and outside the classroom with the Naval Postgraduate School's (NPS) Richard W Hamming Teaching Award. The purpose of this award is to recognize a member of the faculty at NPS who has done an excellent job in of the classroom as evidenced by the students' mastery of the course material; thesis supervision; and has contributed to NPS students' education beyond the classroom. In receiving the award, Dr. Van Bossuyt stated that the award recognizes the team effort that faculty and staff in the Systems Engineering (SE) Department make every day to ensure that SE students receive an excellent education both inside and outside the classroom. Further, the strong outcomes of SE students are a reflection of the quality of the students in SE programs.

Dr. Van Bossuyt's further information on the award is available at: <https://library.nps.edu/hamming-awards>



From left to right: Dr. Joe Klamo, Prof. Joe Sweeney, Dr. Douglas L. Van Bossuyt, Dr. Andy Hernandez, Dr. Oleg Yakimenko, Dr. Fotis Papoulas

Faculty News

Systems Engineering Faculty Receive Systems Engineering Certifications

Two of our SE faculty members recently received their respective professional certification through INCOSE. Congratulations to you both!

The International Council on Systems Engineering's (INCOSes) professional certification program strives to cultivate a community of knowledgeable, experienced, and skilled representatives. INCOSes certification program is a formal process whereby a community of systems engineering representatives provide confirmation of an individual's competency (demonstrated knowledge, education, and experience) in a specified profession.



Corina White



Rabia Khan



Corina White, a Lecturer in the Systems Engineering Department received the Certified Systems Engineering Professional (CSEP). The qualifications for CSEP include education, SE knowledge, and SE experience that serve various job profiles of an experienced, all-round systems engineer and passing the knowledge exam.



Rabia Khan, a Research Associate of the Systems Engineering Department received the Associate Systems Engineering Professional (ASEP) certification. The qualification for the ASEP is possession of SE knowledge typical of a junior systems engineer, as evidenced by passing the knowledge exam.

Student Stories

September Student Meyer Award



Daniel V. Camp

Daniel V. Camp is an aerospace engineer for the U.S. Army Combat Capabilities Development Command, Aviation & Missile Center (DEVCOM AvMC). He develops and matures aircraft structures and vulnerability reduction technology. His areas of focus are aircraft vulnerability reduction and composite aircraft structural design, analysis, and repair. He holds a B.S. in Aerospace Engineering from North Carolina State University.



Kevin Le

Kevin Le, graduated from California State University Long Beach (CSULB), California with Bachelor of Science in Chemical Engineering in 2014. After graduation, he started his career through the Engineer and Scientist Development Program (ESDP) with the Naval Air Warfare Center Weapon Division at China Lake, California.

During the ESDP rotational tours, Kevin has experienced working with different branches including 1) Analytical Chemistry Branch, 2) Propellants and Ordnances Processing, 3) Cyber Security and Research, and 4) Air Vehicle Management system (AVMS)/Communication Identification Navigation (CNI) team at the F/A-18 Integrated Product Team (IPT)

After completing the rotational assignments, Kevin stayed at the F/A-18 IPT and since then, he has been supporting multiple roles such as System Integration Engineer, Flight Test Engineer, and Statement of Requirement (SOR) Team Lead for multiple avionics sub-systems. The sub-systems include the Air Vehicle Management System, Digital Communication System (DCS) radio, Signal Data Computer (SDC), and Multifunctional Information Distribution System (MIDS).

Since 2020, Kevin works with the Joint Mission Planning System (JMPS) team, focusing on mission planning integration of Network Enabled Weapons (N.E.W) across all F/A-18 & EA-18G Software Configuration Sets (SCS) including the Harpoon, JSOW, LRASM, SDB-II, N.E.W and GPS cryptographic capabilities

Any other accomplishments at NPS or if you'd like to highlight what you have learned in your program and how it helps you in your current position

Prior to attending the M.S. in Systems engineering at the Naval Postgraduate School (NPS), at the F/A-18 IPT, I have worked and experienced with some system engineering processes and activities when developing the project schedules, generating system requirements, or developing test plans to test and validate system performances. However, most of my experiences were from on-the-job trainings. This was also one of the reasons that inspires me seeking formal and advance Systems engineering studies from NPS.

The materials taught in the M.S. in Systems engineering program help broaden my knowledge and increase the level of formality in systems engineering. Through the program, I especially found some courses such as Engineering Economics/Cost Estimation, System Software Engineering, Model-Based Systems Engineering (MBSE) and System of Systems Engineering are extremely helpful and will be invaluable in my future career path. I would like to especially thanks to the F/A-18 IPT, Mission System task team management and colleagues that provide the support and encouragement while attending the program.

Student Publishes Research on Energy Savings of using Cyber-Attack Counter Unmanned Aerial Systems

Military Expert (ME5) MAJ Chee Hoe Lee of the Republic of Singapore Air Force (RSAF) recently graduated from the Systems Engineering program where he pursued research on the energy savings of using cyber-attack Counter-Unmanned Aerial Systems (C-UAS) versus jamming C-UAS. His research garnered an outstanding thesis award. During his research, Lee wrote a journal manuscript that became part of his thesis and was also published in August in the journal *Drones*. *He conducted his research under the supervision of Dr. Douglas L. Van Bossuyt (systems engineering) and Dr. Britta Hale (computer science).*

ME5 Chee Hoe Lee is from the Republic of Singapore Air Force (RSAF) and a 2012 graduate of the Nanyang Technological University, attaining a Bachelor of Science in Electrical and Electronics Engineering. He began his military career as an Air Force Engineer with the Unmanned Aerial Vehicle Command, serving as an Officer-In-Charge managing the Hermes-450 UAV system. His expertise includes the management and coordination of reliability and availability improvement programs of the UAV systems in the RSAF. In his next assignment, ME5 Lee will be working on the RSAF A330 Multi-Role Tanker Transport aircraft in support for the effective and the safe conduct of logistical and engineering operations in the Air Engineering and Logistics Department of the RSAF.

Details of his article follow:

Lee, Chee Hoe, Christian Thiessen, Douglas L. Van Bossuyt, and Britta Hale. "A Systems Analysis of Energy Usage and Effectiveness of a Counter-Unmanned Aerial System Using a Cyber-Attack Approach." *Drones* 6, no. 8 (2022): 198.

<https://doi.org/10.3390/drones6080198>

Abstract:

Existing counter-unmanned aerial system (C-UAS) defensive mechanisms rely heavily on radio frequency (RF) jamming techniques that require a large amount of energy to operate. The effects of RF jamming result in undesirable consequences, such as the jamming of other nearby friendly radio devices as well as the increase in RF footprint for local operators. Current cybersecurity analysis of commercial off-the-shelf (COTS) UASs have revealed multiple vulnerabilities that give rise to opportunities to conduct C-UAS operations in the cyber domain. This is achieved by performing cyber-attacks on adversarial UASs through hijacking the device-specific communication's link on a narrow RF band and without the need for broad-spectrum RF energy bursts during C-UAS operations, which can result in lower energy usage to accomplish the same outcome. This article validates the cyber-attack C-UAS (CyC-UAS) concept through reviewing recent C-UAS operational experimental scenarios and conducting analysis on the collected data. Then, a simulation model of a defense facility is constructed to analyze and validate specific mission scenarios of interest and several proposed concepts of operation. A comparison of the energy requirements between CyC-UAS and existing C-UAS techniques is performed to assess energy efficiency and trade-offs of different C-UAS approaches. In this article, the comparison of energy requirements between the CyC-UAS prototype and existing C-UAS products that utilize RF jamming methods reveals that CyC-UAS achieves significant energy savings while not affecting

other telecommunication devices operating at the same frequencies. While both the C-UAS techniques adopt the denial-of-service strategy, the CyC-UAS is able to achieve the same mission by consuming much less energy. Therefore, the CyC-UAS concept shows promise as a new, lower energy, and lower collateral damage approach to defending against UAS.



ME5 Chee Hoe Lee (center) with his advisors, Dr. Douglas L. Van Bossuyt (left) and Dr. Britta Hale (right).

NPS Interdisciplinary Systems Engineering Research Recognized with Best Paper Award at American Society of Mechanical Engineers Conference

A conference paper recently published at the American Society of Mechanical Engineers (ASME) International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE) by NPS systems engineering faculty member Dr. Douglas L. Van Bossuyt and computer science faculty member Dr. Britta Hale was recognized with a Best Paper Award from the Systems Engineering, Information, and Knowledge Management (SEIKM) Technical Committee. The award is presented to one SEIKM paper per year and recognizes a paper that significantly advances research in the SEIKM community.

The paper proposes an approach to model potential compromise and failure of systems used in multi-mission environments from a Zero Trust perspective. The interdisciplinary research examines the physical system, the software, and the people involved in the entire systems engineering process from conceptual design through operations and maintenance. This paper is part of a series of Zero Trust for systems engineering papers that Dr. Van Bossuyt and Dr. Hale have been publishing together with international research partners in recent years.

Van Bossuyt, Douglas L., Britta Hale, Ryan Arlit, Nikolaos Papakonstantinou. "Multi-Mission Engineering with Zero Trust: a Modeling Methodology and Application to Contested Offshore Wind Farms." In *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*. American Society of Mechanical Engineers, 2022. https://www.researchgate.net/publication/362723229_Multi-Mission_Engineering_with_Zero_Trust_A_Modeling_Methodology_and_Application_to_Contested_Offshore_Wind_Farms

Abstract:

With the growth of autonomy and augmentation of machine learning in system decision-making, systems-of-systems (SoS) have become increasingly complex. Security and safety, as well as national economic stability, are reliant on interconnected systems with multiple decision making components. While such inter-connectivity advances the speed at which action and mission control decision making can take place, it also increases the number of dependencies at risk in the case of an attack and the speed at which attacks become effective in their goals. Attacks on the supply chain and on system lifecycle phases other than the operation are also becoming more common. In this paper we consider from a mission engineering perspective a complex reconfigurable SoS covering management of a wind farm with autonomous uncrewed patrol systems, crewed maintenance vessels, back-end control and machine learning components. The complex SoS is situated in the exclusive economic zone of one country, but with perimetric position to regional power competitors. We investigate causal effects of adversarial capabilities in the case study, using a zero trust combined with Defense in Depth approach. Of particular interest are situations where an adversary injects an incipient fault during one mission that is only brought to fruition during a subsequent mission.



(from left) Dr. Caterina Rizzi, the CIE Program Chair, Dr. Paul Witherell, the CIE Conference Chair, and Dr. Douglas L. Van Bossuyt receiving the Best Paper Award

Systems Engineering Professor Contributes to Newly Issued American Nuclear Society Standard for Light Water Reactor Risk-Informed, Performance-Based Design

The American Nuclear Society and American National Standard Institute recently published a new standard focusing on how to conduct risk-informed, performance based design for light water nuclear reactors. NPS Systems Engineering Department faculty member Dr. Douglas L. Van Bossuyt served on the Working Group that developed the standard.

The standard establishes requirements for using risk-informed, performance-based (RIPB) methods for advanced light water reactor designs. RIPB methods are provided to ensure that nuclear safety design practices are consistently applied to all new advanced light water reactor technologies, specifically, high-level safety criteria selection, nuclear safety functions and margin, licensing-basis event selection and acceptance criteria, equipment classification and categorization, defense-in-depth adequacy, and evaluating conformance with regulatory positions.

The standard can be found at: American National Standard ANSI/ANS-30.3-2022: Light Water Reactor Risk-Informed, Performance-Based Design. American Nuclear Society, La Grange Park, Illinois. 2022.

The standard is available at: https://www.techstreet.com/ans/standards/ans-30-3-2022?product_id=2259746

Systems Engineering Seminar Revitalized

After a hiatus during the COVID-19 pandemic, Dr. Ron Giachetti has revitalized the Systems Engineering Seminar series that resident systems engineering students attend. Students attend in-person and virtual seminars presented by Navy, DoD, defense industry, and systems engineering professionals. Additionally, graduating students are encouraged present their thesis work to the entire Systems Engineering resident student body. In September 2022, four graduating students presented their theses. Their thesis titles and abstracts are listed below:

Mr. Yi Cheng Chan

Advisor: Dr. Oleg A. Yakimenko, Second Reader: Dr. Fotis Papoulas

Abstract: Navigation systems of unmanned aircraft systems (UAS) are heavily dependent on the availability of Global Positioning Systems (GPS) or other Global Navigation Satellite Systems (GNSS). Although inertial navigation systems (INS) can provide position and velocity of an aircraft based on acceleration measurements, the information degrades over time and reduces the capability of the system. In a GPS-denied environment, a UAS must utilize alternative sensor sources for navigating. This thesis presents preliminary evaluation results on the usage of onboard down-looking electro-optical sensors and image matching techniques to assist in GPS-free navigation of aerial platforms. Following the presentation of the fundamental mathematics behind the proposed concept, the thesis analyzes the key results from three flight campaign experiments that use different sets of sensors to collect data. Each of the flight experiments explores different sensor setups, assesses a variety of image processing methods, looks at different terrain environments, and reveals limitations related to the proposed approach. In addition, an attempt to incorporate navigational aid solutions into a navigation system using a Kalman filter is demonstrated. The thesis concludes with recommendations for future research on developing an integrated navigation system that relies on inertial measurement unit data complemented by the positional fixes from the image-matching technique.

MAJ. Wee Sing Cheng

Advisor: Dr. Anthony G. Pollman; Co-Advisor: Mr. Jeffrey E. Kline; Second Reader: Dr. Dan Nussbaum

Abstract: This thesis focuses on using liquid hydrogen (LH2) technologies as a single naval fuel onboard a vessel. The case study in this thesis is a 1000 twenty-foot equivalent unit (TEU) catamaran container vessel (CV) as a proxy to the United States (U.S.) Navy's Spearhead Class vessel. These two vessels are both built with catamaran hulls and have similar tonnage. The case study was assumed to have travelled a distance of 4838 nm and a travelling time of 194 hrs.

Design replacements and modifications were proposed in order to meet the case study energy requirements following which RetScreen and Microsoft Excel were used to evaluate this system based over a 20-year project life. Overall, the proposed hydrogen fuel system as a single naval fuel is financially unfeasible as the economic profits do not look promising when compared to the estimated required investment at the start.

Further investigation is recommended to determine whether the proposed hydrogen fuel system mentioned in this thesis can combined with other renewable technologies as they become available. Actual implementation on a military vessel may not be practical now due to the high initial costs.

CPT. Eunice Xing Fang Ong

Advisor: Dr. Weilian Su; Co-Advisor: Dr. Anthony G. Pollman

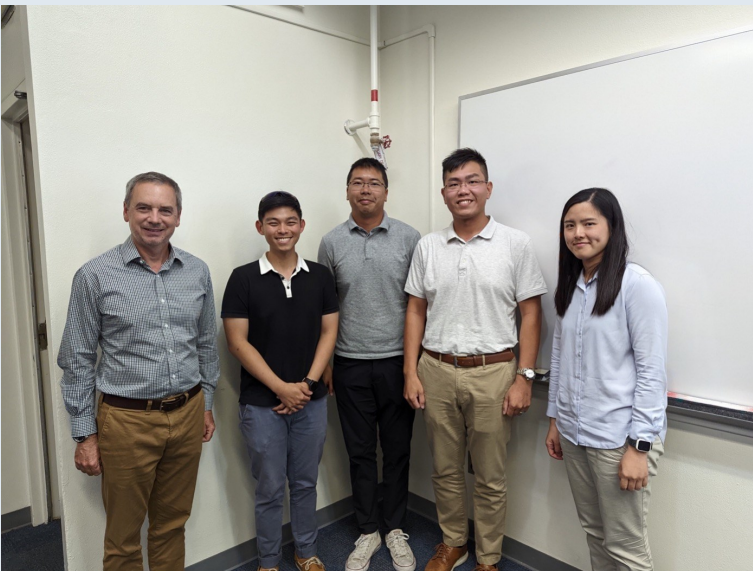
Abstract: Many armed forces are becoming network-centric and highly interconnected. This transformation, along with decentralized decision-making, has been enabled by technological advancements in the digital battlefield. As the battlefield evolves and missions require units to be mobile and support numerous tactical capabilities, the current concept of deploying static radio-relay nodes to extend the range of communication may no longer be suitable. Hence, this thesis aims to design an operational concept using unmanned aerial systems such as aerostats and tactical drones to provide beyond line-of-sight communication for tactical forces while overcoming the limitations in a GPS-denied environment. The proposed concept is divided into three phases to assess operational and communication system needs, given Federal Communications Commission regulations that set the maximum effective isotropic radiated power in the industrial, scientific, and medical band at 36 dBm. The maximum communication range between two nodes can be studied using the Friis propagation equation. In addition, Simulink software is used to study the effective application throughput with respect to distance. From the analysis, IEEE 802.11ax can provide a higher data throughput and support both 2.4 GHz and 5.0 GHz frequency bands. Using a simulated environment and operational scenario, the estimated number of aerial systems required to provide communication coverage for a 50 km by 50 km area is determined.

CPT Wei Kang J. Tang

Advisor: Dr. Paul T. Beery; Co-Advisor: Dr. Andy S. Hernandez; Second Reader: Ms. Mary McDonald

Abstract: This thesis analyzes the impact of deploying loitering munitions and tactical drones with a company-level armored combat team in an offensive urban operation, using Map Aware Non-Uniform Automata (MANA) as the simulation tool. An armored combat team of the Armored Brigade Combat Team (ABCT) was modelled as part of an offensive urban operation, as a baseline to understand the impacts of Raven RQ-11 and M109A6 Howitzer, subsequently replacing them with the loitering munitions and tactical drones. The design of experiment incorporates a total of seven performance parameters of loitering munitions and tactical drones, and utilized the Nearly Orthogonal and Balanced (NOB) method to generate a total of 256 design points with 350 replications each. JMP Pro 16 software was utilized to analyze the operational effectiveness of the loitering munitions and tactical drones, and assess the key performance parameters of the loitering munitions and tactical drones. It was observed that the significant factors in order of significance were loitering munition's force structure, loitering munition's classification range and tactical drone's endurance, and indicated that the employment of loitering munition and tactical drones enhanced the operational effectiveness of the armored company. This analysis would aid capability analysts in considering the procurement and deployment of sense and strike capabilities, with respect to potential inter-system interaction and key performance parameters.

If you are interested in presenting a seminar to the resident Systems Engineering student body, or hosting a site visit at your greater Monterey Bay and Silicon Valley location, please get in touch with Dr. Ron Giachetti regiache@nps.edu



From left to right: Dr. Ron Giachetti, CPT Wei Kang J. Tang, MAJ. Wee Sing Cheng, Mr. Yi Cheng Chan, CPT. Eunice Xing Fang Ong.

Awards and Graduations

Awards

Richard W. Hamming Teaching Award

Dr. Douglas Van Bossuyt

Meyer Award for Outstanding DL Student in Systems Engineering

311-211O: Mr. Kevin Huy Le, Naval Weapons Division, China Lake

721-211: LT Frank Conenna Jr., USN

722-211G: Mr. Daniel V. Camp, Army Combat Capabilities Development Command, Aviation and Missile Center

Meyer Award in systems Engineering for DL Teaching

311-211O: Rama D Gehris

721-211: Kristin Giammarco

722-211G: Mark Sykes

Outstanding Captone

Cohort 311-211O Team Model Wreckers

Title: ACCESSING INTEROPERABILITY BETWEEN BEHAVIOR DIAGRAMS CONSTRUCTED WITH SYSTEMS MODELING LANGUAGE (SYSML) AND MONTEREY PHOENIX (MP)

Members: Joseph Hall III, Kevin Le, Krunal Patel, and Michael Savacool

Advisors: Kristin Giammarco and Scot Miller

Cohort 722-211G My Favorite Team

Title: BATTERY USAGE IN THE FUTURE FLEET

Members: Sean Auld, Daniel Camp, Paul Kylander, Nathan Vey, and Jerald Willis

Advisors: Douglas Van Bossuyt, Ross Eldred, and Jonathan Lussier

Outstanding Thesis

MAJ Jhovanie Tang, Singapore Army

Mr. Yi Cheng Chan, DSO National Laboratories

ME5 Chee Hoe Lee, Republic of Singapore Air Force

Mr. Andrew W. Machamer, Naval Sea Systems Command

Mr. John H. Phillips, Naval Undersea Warfare Center, Division Newport

Recommendation for Graduation with Distinction

Mr. Yi Cheng Chan, DSO National Laboratories

MAJ Jia Ming Neo, Singapore Army

Mr. Kevin Huy Le, Naval Air Warfare Center Weapons Division, China Lake

Mr. Joseph E. Novick, Naval Surface Warfare Center, Indian Head

Mr. Gus Walker Paras, Naval Surface Warfare Center Indian Head

Mr. Daniel V. Camp, Army Combat Capabilities Development Command, Aviation and Missile Center

Mr. Steven F. Daley, Program Executive Office - Ground Combat Systems

Mr. Martin L. Hogan, Program Executive Office Ground Combat Systems

Individual Theses

Mr. Lee M. Boaman

Thesis Title: SYSTEMS ENGINEERING TALENT MANAGEMENT AT NAVAL INFORMATION WARFARE CENTER (NIWC) ATLANTIC

Advisor: Cliff Whitcomb

Co-Advisor: Corina White

Mr. Yi Cheng Chan

Thesis Title: ASSESSMENT OF ELECTRO-OPTICAL IMAGING TECHNOLOGY FOR UNMANNED AERIAL SYSTEM NAVIGATION IN A GPS-DENIED ENVIRONMENT

Advisor: Oleg Yakimenko

Co-Advisor: Fotis Papoulas

ME5 Wee Sing Cheng

Thesis Title: CONCEPT DEVELOPMENT AND OPERATIONAL ANALYSIS OF USING HYDROGEN AS A SINGLE NAVAL FUEL

Advisor: Anthony Pollman

Co-Advisor: Jeffrey Kline

Second Reader: Daniel Nussbaum

LT Frank Conenna Jr., USN

Thesis Title: EMERGENT BEHAVIOR ANALYSIS OF MARITIME OVER-THE-HORIZON COMMUNICATION USING LASERS AND SPACE PLATFORM RELAYS

Advisor: Bonnie Johnson

Co-Advisors: Mike Green

Mr. Michael. C. Donovan

Thesis Title: ASSESSMENT OF MODEL CONVERSION FROM GENESYS TO MAGIC SYSTEM OF SYSTEMS ARCHITECTURE FOR MODEL-BASED SYSTEMS ENGINEERING INTEROPERABILITY

Co-Advisor: Paul Beery and Ron Giachetti

Mrs. Raffianne Noel Doyle

Thesis Title: MISSION ENGINEERING METHODOLOGY FOR REALIZATION OF UNMANNED SURFACE VESSEL OPERATIONS

Advisor: Shelley Gallup

Reader: Katy Giles

Mrs. Angel M. Gill

Thesis Title: A REPEATABLE THREAT-BASED REQUIREMENTS GENERATION PROCESS LEVERAGING MODEL-BASED SYSTEMS ENGINEERING FOR JOINT EXPLOSIVE ORDNANCE DISPOSAL AND AN ANALYSIS OF RAPID LARGE AREA CLEARANCE

Advisor: Mike Green

Co-Advisor: Bonnie Johnson

ME5 Justin He

Thesis Title: EXPERIMENTAL VALIDATION OF RESILIENCE MODELS FOR ISLANDED MICROGRIDS FOR MILITARY OPERATIONS

Advisor: Douglas Van Bossuyt

Co-Advisor: Anthony Pollman

Individual Theses continued

ENS Christopher T. Lambert, USN

Thesis Title: EFFECTIVENESS OF NAVAL INTRODUCTORY FLIGHT EVALUATION (NIFE)

Advisor: Katy Giles

Co-Advisor: Rob Semmens

Mrs. Amy W. Lee

Thesis Title: BETTER ESTIMATION OF COMPLETION TIMES FOR SHIPS UNDERGOING CNO AVAILABILITIES

Advisor: Ron Giachetti

Co-Advisor: Paul Beery

Mr. Bryan H Lee

Thesis Title: AN AUTOMATED AND DYNAMIC DECISION AID FOR FLET COMMANDER AND COMBATTANT COMMAND STRATEGIV AND OPERATIONAL PLANNING

Advisor: Bonnie Johnson

Co-Advisor: Scot Miller

ME5 Chee Hoe Lee

Thesis Title: ASYSTEMS ANALYSIS OF ENERGY USAGE AND EFFECTIVENESS OF A COUNTER-UNMANNED AERIAL SYSTEM USING A CYBER-ATTACK APPROACH

Advisor: Douglas Van Bossuyt

Co-Advisors: Britta Hale

Mr. Andrew W. Machamer

Thesis Title: OPTIMIZING THE PERIODICITY OF PREVENTATIVE MAINTENANCE INSPECTIONS BASED ON HISTORICAL RELIABILITY DATA

Advisor: Douglas Van Bossuyt

Reader: Mark Rhoades

Mr. Peter Franz McCauley

Thesis Title: IDENTIFICATION OF THE FORMAL AND INFORMAL NETWORKS OF NAVAL SEA SYSTEMS COMMAND (NAVSEA) TECHNICAL AUTHORITY (TA) TO ACHIEVE ORGANIZATIONAL TRANSITION TO MODEL0BASED SYSTEMS ENGINEERING (MBSE)

Advisor: Deborah Gibbons

Co-Advisor: Kristin Giammarco

Mr. Joseph E. Novick

Thesis Title: MINIMUM VIABLE PRODUCT AS AN ENGINEERING STRATEGY FOR URGENT NEEDS ACQUISITION: A CASE STUDY OF THE HIGH-MOBILITY DECONTAMINATION SYSTEM

Advisor: Charles Pickar

Reader: Ron Carlson

Individual Theses continued

CPT Eunice Ong

Thesis Title: ONCEPTUALIZATION AND ANALYSIS OF USING UNMANNED AERIAL VEHICLES AS COMMUNICATIONS RELAYS IN A GPS-DENIED ENVIRONMENT

Advisor: Weilian Su

Co-Advisor: Anthony Pollman

Mr. John Paul Pagel

Thesis Title: A STUDY OF SPACE-BASED SOLAR POWER SYSTEMS

Advisor: Bonnie Johnson

Co-Advisor: Mike Green

Mr. Gus Walker Paras

Thesis Title: USING MODEL-BASED SYSTEMS ENGINEERING TO IMPROVE PROCESS MANAGEMENT IN THE DOD

Advisor: Warren Vaneman

Reader: Ron Carlson

Mr. John H. Phillips

Thesis Title: MODELING AUTONOMOUS PERFORMANCE OF UNMANNED SYSTEMS (UXS) TO LOWER PROGRAM RISK

Advisor: Kristin Giammarco

Co-Advisors: Shelley Gallup

Reader: Raymond Buettner

MAJ Boon Kiat Phua

Thesis Title: AN OPERATIONAL EFFECTIVENESS ANALYSIS ON MANNED-UNMANNED TEAMING USING WEAPONIZED UNMANNED VEHICLES IN URBAN TERRAIN

Advisor: Thomas Lucas

Co-Advisor: Andy Hernandez

Reader: Mary McDonald

Mr. Nicholas K. Savage

Thesis Title: EVALUATION OF THE SYSTEMS ENGINEERING CHALLENGES AND RECOMMENDATIONS FOR THE US NAVAL SUBMARINE OK-276 REELABLE TOWED ARRAY HANDLING SYSTEM'S RECONFIGURABLE DATA BOX

Advisor: Ron Giachetti

Reader: Mike Green

Mr. Raymond Joseph Stone

Thesis Title: APPLICATION OF AN ONTOLOGY-DRIVEN FRAMEWORK TO A MARINE CORPS ACQUISITION PROGRAM

Advisor: Warren Vaneman

Reader: Ron Carlson

Individual Theses continued

MAJ Jhovanie Tang

Thesis Title: SYSTEMS ANALYSIS OF SENSE AND STRIKE CAPABILITIES WITHIN AN ARMORED COMBAT UNIT IN AN OFFENSIVE URBAN OPERATION

Advisor: Paul Beery

Co-Advisor: Andy Hernandez

Reader: Mary McDonald

MAJ Kenny Teo

Thesis Title: AN OPERATIONAL EFFECTIVENESS ANALYSIS ON SMALL ARMS SHOOTING PRECISION IN CLOSE QUARTERS BATTLE

Advisor: Thomas Lucas

Co-Advisor: Andy Hernandez

Reader: Mary McDonald

Mr. Robert Turner

Thesis Title: CORROSION PROTECTION IN THE DESERT

Advisor: Troy Ansell

Reader: Rama Gehris

Mrs. Leandra R. Villalpando

Thesis Title: MOBILE CUBESAT COMMAND AND CONTROL GROUND STATION ARCHITECTURE FOR FREE-SPACE OPTICAL COMMUNICATION RECEIVER

Advisor: Giovanni Minelli

Reader: Wally Owen

Mr. Xue Yong Yap

Thesis Title: DIGITAL TWIN (MODEL-BASED SYSTEM ENGINEERING) ON FAILURE ANALYSIS FOR A SYSTEM (ENGINE)

Advisor: Douglas Van Bossuyt

Co-Advisor: Jason Bickford and Mark Rhoades

Capstone Teams

Team Name: 208-221

Capstone Title: MISSION ENGINEERING FOR HYBRID FORCE 2025

Members: Jeremy Brown, Nicholas Coker, Alyson Groff, Jin Meng Bryan Low, Jia Ming Neo, Lesleigh Rodrigo, Joshua Schultz, William Sunda III, Nathan Walker

Advisor: Fotis Papoulias and Jefferson Huang

Team Name: 311-2110 Team Al Trio

Title: ARTIFICIAL INTELLIGENCE-ENABLED MULTI-MISSION RESOURCE ALLOCATION TACTICAL DECISION AID

Members: Christopher Ghigliotti, Tara Sprinkle, and Kelly Tesch

Advisors: Bonnie Johnson and Scot Miller

Team Name: 311-2110 Team Aime

Title: CYBER ATTACKS ON NAVAL INDUSTRIAL CONTROL SYSTEMS-EXPLORING CYBER THREATS, SHIP SYSTEM VULNERABILITIES, AND CYBER ATTACK DETECTION

Members: Mursleen Mumtaz, Christopher Ray, Richard Tawney and Shannon Zoch

Advisors: Bonnie Johnson and Mike Green

Team Name: 311-2110 Team Dry Dockers

Capstone Title: INVESTIGATION INTO CRITICAL RESOURCES FOR PLANNING, MANNING, AND SUSTAINING THE NAVY'S CNO AVAILABILITIES OF THE FLEET'S SURFACE COMBATANTS

Members: Marcus Chavez, Morgan Garone, Travis Kennamore, and Sydney Walton

Advisor: Paul Beery and Gene Paulo

Team Name: 311-2110 Team Model Wreckers

Title: ASSESSING INTEROPERABILITY BETWEEN BEHAVIOR DIAGRAMS CONSTRUCTED WITH SYSTEMS MODELING LANGUAGE (SYSML) AND MONTEREY PHOENIX (MP)

Members: Joseph Hall III, Kevin Le, Krunal Patel, and Michael Savacool

Advisors: Kristin Giammarco and Scot Miller

Team Name: 722-211G My Favorite Team

Title: BATTERY USAGE IN THE FUTURE FLEET

Members: Sean Auld, Daniel Camp, Paul Kylander, Nathan Vey, and Jerald Willis

Advisors: Douglas Van Bossuyt, Ross Eldred, and Jonathan Lussier

Team Name: 722-211G Team DINomite

Title: ARTIFICIAL INTELLIGENCE AND HUMAN INTERACTION: HOW TO KEEP THE HUMAN IN THE LOOP

Members: Ashley Gizas, Benjamin Hill, Megan Meisner, Dawn Patterson, and Nicole Wilson

Advisors: Paul Beery, Matthew Nicholson, and Rob Semmens

Team Name: 722-211G Team Off the Chain

Title: TACTICAL BLOCKCHAIN TO PROVIDE DATA PROVENANCE IN SUPPORT OF INTERNET OF BATTLEFIELD THINGS AND BIG DATA ANALYTICS

Members: Gregory Dogum, Kristin Jones Maia, Michele Meszaros, Jonathan Novoa, and Rene Villarreal

Advisors: Bonnie Johnson and Mike Green

Team Name: 722-211G Team Warren

Title: RECOMMENDATIONS FOR IMPROVING SOFTWARE COST ESTIMATION IN DOD ACQUISITION

Members: Steven Daley, Martin Hogan, Joshua Stokes, and Suzanne Vermeulen

Advisors: Ray Madachy and Mike Green

Master of Science in Systems Engineering

MAJ Jhovanie Tang, Singapore Army
MAJ Kenny Teo, Singapore Army
ME5 WeeSing Cheng, Republic of Singapore Navy
ME5 Justin He, Republic of Singapore Air Force
Mr. Chan Yi Cheng, DSO National Laboratories
Mr. Xue Yong Yap, ST Engineering Land systems Ltd.
ME5 Chee Hoe Lee, Republic of Singapore Air Force
MAJ Boon Kiat Phua, Singapore Army
LCDR Shannon Zoch, USN
MR. Marcus E. Chavez, Army Test & Evaluation Command
Ms. Morgan Nicole Garone, Naval Air Warfare Center, Weapons
Mr. Christopher J. Ghigliotti, Letterkenny Army Depot
Mr. Joseph F. Hall III, Missile Defense Agency
Mr. Travis B. Kennamore, US Army Test & Evaluation Command, Redstone Test Center
Mr. Kevin Huy Le, Naval Air Warfare Center Weapons Division, China Lake
Mr. Mursleen Mumtaz, USN
Mr. Krunal V. Patel, Naval Air Warfare Center Weapons Division, China Lake
Mr. Christopher Ray, US Army Futures Command Armaments Center
Mr. Michael A. Savacool, US Army Evaluation Center
Ms. Tara RuthAnn Sprinkle, DEVCOM Aviation & Missile Center, Redstone Arsenal
Mr. Richard J. Tawney, Naval Air Warfare Center Weapons Division, China Lake
Ms. Kelly Tesch, Naval Surface Warfare Center, Corona Division
Ms. Sydney Alis Walton, Naval Air Warfare Center Weapons Division, China Lake

Master of Science in Engineering Systems

CPT Eunice Ong, Singapore Army

Master of Science in Systems Engineering Analysis

MAJ Neo Jia Ming, Singapore Army
MAJ Jin Meng Bryan Low, Republic of Singapore Navy
ENS Christopher T. Lambert, USN

Master of Science in Systems Engineering Management

Ms. Suzanne Vermeulen, USA
LT Frank Conenna Jr., USN
Mrs. Raffianne Noel Doyle, USN
Mr. Sean G. Auld, Army Contracting Command Aberdeen Proving Ground Natick Division
Mr. Lee M. Boaman, Naval Information Warfare Center Atlantic,
Mr. Daniel V. Camp, Army Combat Capabilities Development Command, Aviation and Missile Center
Mr. Steven F. Daley, Program Executive Office—Ground Combat Systems
Mr. Gregory S. Dogum, Army Combat Capability Development Command Analysis Center
Mr. Michael C. Donovan, Naval Air Warfare Center, Aircraft Division, Lakehurst
Mrs. Angel M. Gill, Naval Surface Warfare Center Indian Head
Mrs. Ashley N. Gizas, Army Contracting Command

Master of Science in Systems Engineering Management, continued

Mr. Benjamin R. Hill, US Army Test & Evaluation Command, Redstone Test Center

Mr. Martine L. Hogan, Program Executive Officer Ground Combat Systems

Ms. Kristin L. Jones Maia, US Army Medical Research and Development Command

Mr. Paul W. Kylander, United States Special Operations Command

Mrs. Amy W. Lee, Naval Surface Warfare Center Port Hueneme Division

Mr. Bryan H Lee, US Indo-Pacific Command

Mr. Andrew W. Machamer, Naval Sea Systems Command

Mr. Peter Franz McCauley, Naval Sea Systems Command

Mrs. Megan Meisner, Aviation and Missile Center, Combat Capabilities Development Command

Ms. Michele Irene Meszaros, Project Manager Mission Command

Mr. Joseph E. Novick, Naval Surface Warfare Center, Indian Head

Mr. Jonathan Novoa, Army Futures Command

Mr. John Paul Pagel, Naval Information Warfare Center, Pacific

Mr. Gus Walker Paras, Naval Surface Warfare Center Indian Head

Mrs. Dawn P. Patterson, Department of the Army / Program Executive Office Missiles and Space

Mr. John H. Phillips, Naval Undersea Warfare Center, Division Newport

Mr. Nicholas K. Savage, Naval Undersea Warfare Center, Division Newport

Mr. Joshua D. Stokes, Program Executive Office Ground Combat Systems

Mr. Raymond Joseph Stone, Marine Corps Systems Command, Program Executive Office Land Systems

Mr. Robert Turner, Engineering and Expeditionary Warfare Center

Mr. Nathan Vey, Army Combat Capabilities Development Command, Soldier Center

Mr. Rene Alejandro Villarreal, Program Executive Office Intelligence Electronic Warfare & Sensors

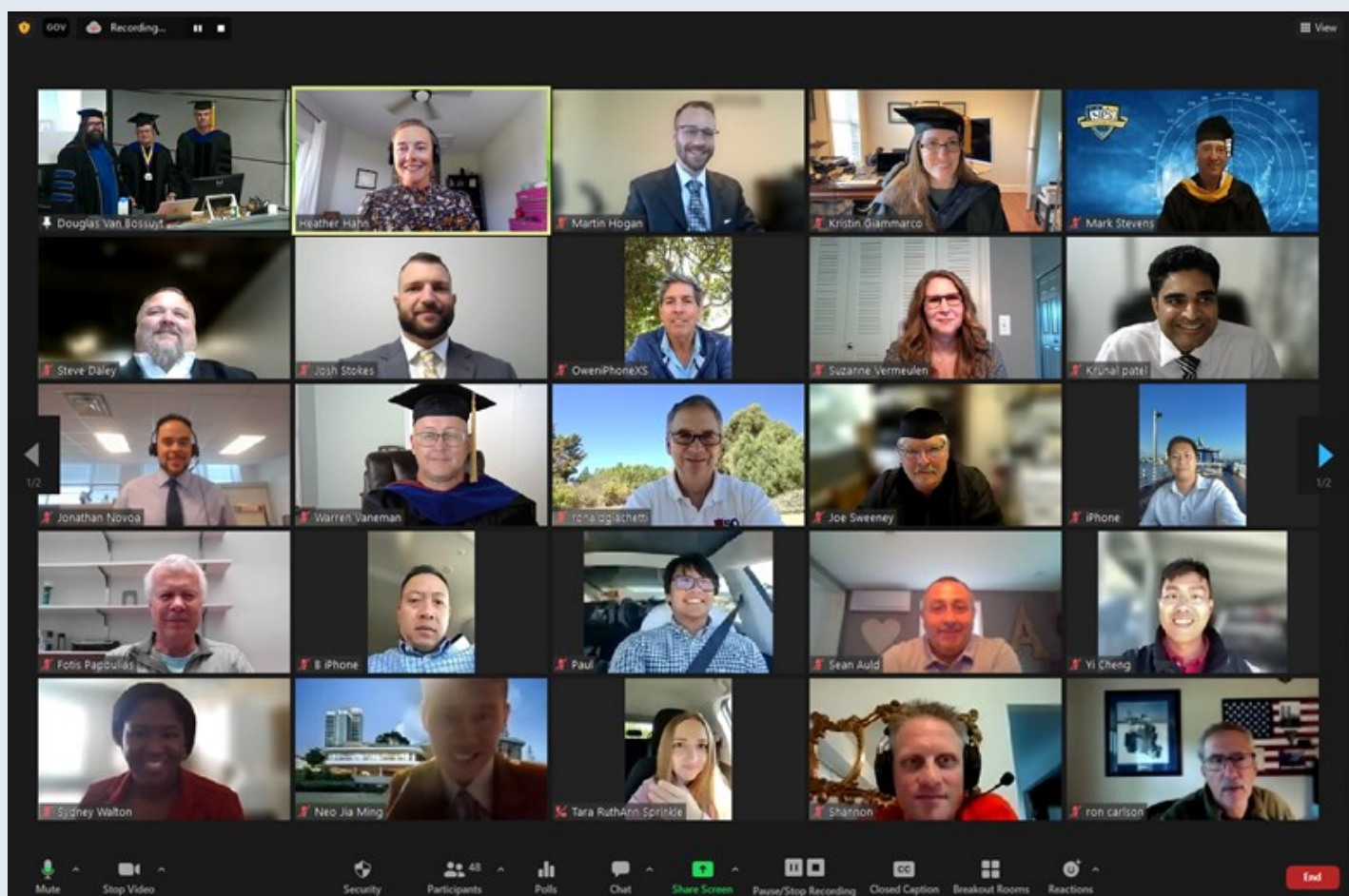
Mrs. Leandra R. Villalpando, Naval Information Warfare Center

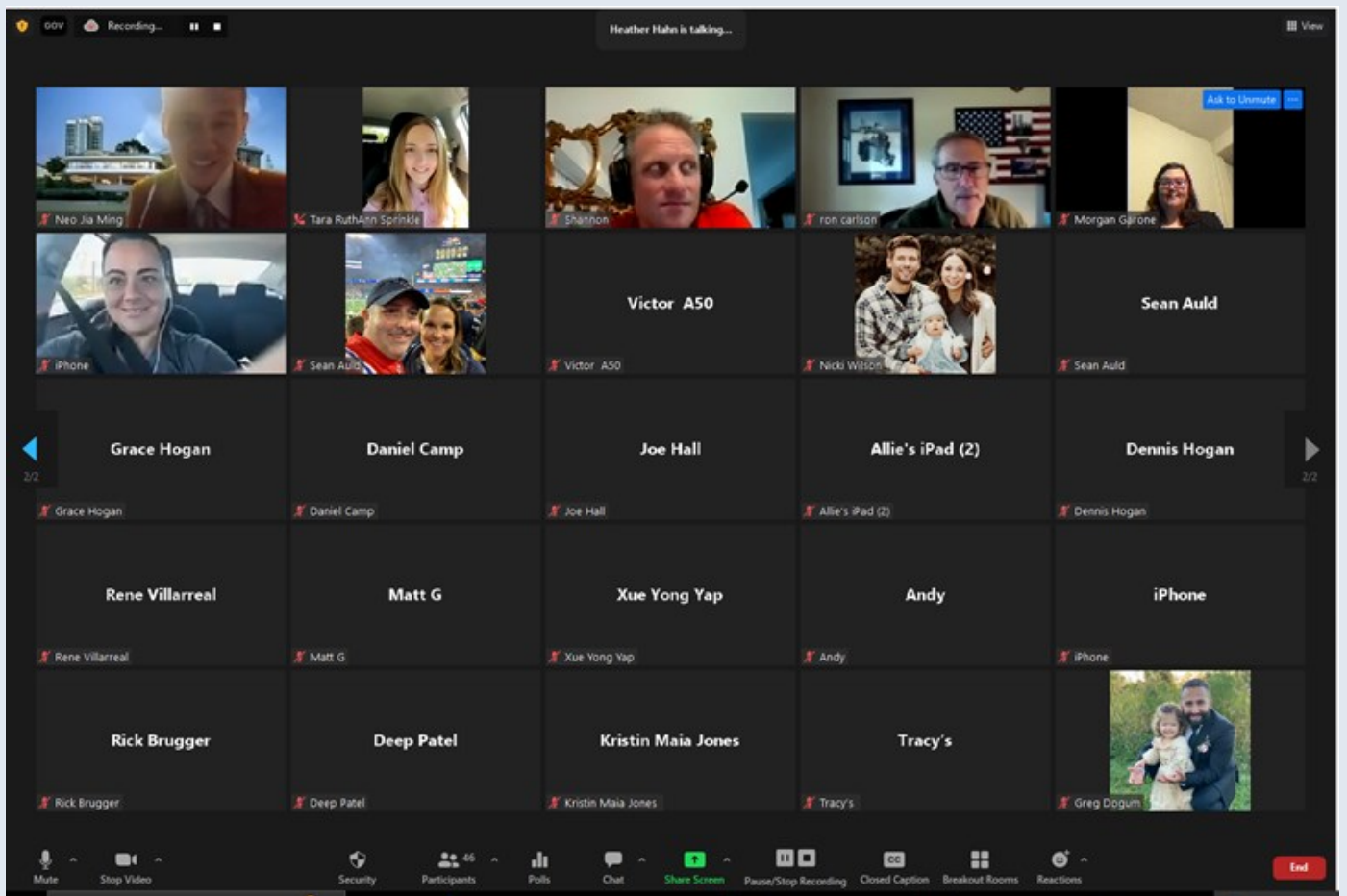
Mr. Jerald Willies, Program Executive Office Enterprise Information Systems Intelligence Electronic Warfare & Sensors

Mrs. Nicole Elizabeth Wilson, Army Program Executive Office Enterprise Information Systems, Computer Hardware Enterprise Software and Solutions

Systems Engineering Distance Learning Graduation Photos







Request for Alumni News!

The SE Department is interesting in hearing how our alumni are doing.
Please feel free to send the [editor](#) news items for inclusion in future newsletters.

If you would like to subscribe to the Systems Engineering Newsletter, please click [here](#).

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