

FAA CHALLENGE

Smart Connected Aviation Student Competition



Federal Aviation
Administration

2022 VIRTUAL FORUM PROGRAM BOOK

June 22-23, 2022

<http://faachallenge.nianet.org/>

#FAAChallenge2021

#AviationSTEM

#FAASTEM

2022 FAA Challenge: Smart Connected Aviation Student Competition Virtual Forum

Forum Agenda



WEDNESDAY, JUNE 22, 2022

- | | |
|------------------|--|
| 11:00 – 11:20 am | FAA Welcome and Opening Remarks
Shelley Yak, Federal Aviation Administration |
| 11:20 – 11:35 am | FAA Smart Connected Aviation Overview
Jon Schleifer, Federal Aviation Administration |
| 11:35 – 11:55 am | FAA Challenge Steering Committee Introductions |
| 11:55 – 12:00 pm | Introductions into Team Presentations |

TEAM PRESENTATIONS

General Aviation Demonstrations

- | | |
|------------------|---|
| | Hampton University |
| 12:00 – 12:45 pm | “R.I.P.S.: Runway Incursion Prevention System” |
| 12:45 – 1:15 pm | Q&A Session |

1:15 – 1:25 pm Break

- | | |
|----------------|----------------------------------|
| | Oklahoma State University |
| 1:25 – 2:10 pm | “Squawk ForeFlight” |
| 2:10 – 2:40 pm | Q&A Session |

2:40 – 2:50 pm Break

Emerging Operations Demonstrations

- | | |
|----------------|--|
| | Morgan State University |
| 2:50 – 3:35 pm | “A Simulation of a Real-Time Cloud-Based Communication Bluetooth Low Energy (BLE) System in Automatic Dependent Surveillance-Broadcast (ADS-B) for Unmanned Aerial Systems (UAS)” |
| 3:35 – 4:05 pm | Q&A Session |

4:05 – 4:15 pm Break

- | | |
|----------------|--|
| | Purdue University |
| 4:15 – 5:00 pm | “Advanced Air Mobility as an Electric Grid Demand Response Asset” |
| 5:00 – 5:30 pm | Q&A Session |

5:30 – 5:35 pm Adjourn

The 2022 FAA Virtual Forum will be live streamed at <https://livestream.com/viewnow/faachallenge>.
All times are in Eastern Daylight Time (EDT).

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THURSDAY, JUNE 23, 2022

12:00 – 12:15 pm	Day 2 Welcome
12:15 – 1:15 pm	Poster Session
1:15 – 1:25 pm	Break
1:25 – 2:10 pm	“Entrepreneurial Mindset” Brandon Graham, Smart Airport Aviation Partnership (SAAP)
2:10 – 3:10 pm	Employee Engagement Team Panel Moderated by Lyndsay Digneo Lauren Rainier, Alexander Revolus, Jim Ritchie, Stephanie Stead
3:10 – 3:20 pm	Break
3:20 – 3:50 pm	“FAA Smart Airport Student Challenge” Nikolai Drigal, Pacific Northwest National Laboratory
3:50 – 4:20 pm	“From Intern to Management: A Path Taken” Edward Marciano, Federal Aviation Administration
4:20 – 4:30 pm	Online Group Photo
4:30 – 4:55 pm	Awards Ceremony presented by Shelley Yak
4:55 – 5:00 pm	Wrap-up and Adjourn

For more information about the 2022 FAA Challenge, please visit

<http://faachallenge.nianet.org>

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Challenge Leadership Team



Shelley Yak – Federal Aviation Administration

Director, William J. Hughes Technical Center



Ms. Shelley Yak serves as principal advisor and is responsible for managing, operating, and maintaining world class aviation laboratories; planning and coordinating FAA's research and development program; conducting applied research and development; testing, evaluating, verifying, and validating current national airspace system and future next generation air transportation systems; providing facility maintenance, engineering support, support services for all properties located at the William J. Hughes Technical Center.

Ms. Yak has extensive operational experience in leading organizations through change, building cross-organizational teams, leveraging strong project management and leadership capabilities to build effective business processes and deliver technology solutions. Her prior position within the FAA included Deputy Director that supported the previous Director in making the Center the nation's premier aviation and air traffic management federal laboratory. Ms. Yak was also the Division Manager of the Center Operations team where she was responsible for the operation, maintenance, and sustainment of the Technical Center facilities, which provide support and technical services. During her tenure in this position, she also acted in the position of Director of NextGen Performance and Reporting and was responsible for defining and establishing this newly formed organization and Director of Operational Evolution Partnership Planning. Previously, Ms. Yak held the position of Division Manager of Information Technology (IT) responsible for the management and security of the Technical Center IT network and telecommunications infrastructure, help desk and desktop support services, and software application development and support. Prior to joining the FAA in 1997, Ms. Yak was the Superintendent of Power Delivery Dispatch and Support for Atlantic City Electric where she oversaw the dispatch of personnel responsible for the investigation and restoration of power during normal and emergency conditions and the technical staff responsible for maintaining, operating and supporting the Energy Management and Power Distribution Management computer systems.

Ms. Yak holds a B.S. in Information and System Science from Stockton University and a M.S. in Engineering Management from Rowan University. She has received numerous internal and industry leadership and excellence awards throughout her career and resides in Little Egg Harbor Township, New Jersey with her husband and two sons.

Jon Schleifer – Federal Aviation Administration

Manager, Research & Development Management Division, William J. Hughes Technical Center



Mr. Jon Schleifer serves as the Manager of the Research and Development Management Division. He is responsible in providing planning and coordination of the FAA's R&D program. Jon manages the work of a large, multi-level organization, integrates work of multiple organizations to meet strategic goals of the FAA. He additionally participates in strategic planning for the FAA.

Mr. Schleifer additionally provides leadership in the formulation, presentation and coordination of aviation research priorities across FAA lines of business and with other agencies, Advisory Boards and international organizations, to ensure agency investments address known research needs, emerging aviation issues and supports continued United States global leadership in aviation. He aligns research programs with the Administrator's strategic initiatives, the Department of Transportation R&D strategic plan, and other national plans and policy directives

governing aviation and aeronautics research.

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Karen Davis – Federal Aviation Administration
Business Account Manager



Ms. Karen Davis is a Business Account Manager for the Federal Aviation Administration's William J. Hughes Technical Center (WJHTC). Ms. Davis began her federal career as a Contract Specialist with the Department of Defense in 2005 and has been at the FAA WJHTC in Atlantic City, New Jersey, since 2015. As a Business Account Manager, Ms. Davis serves as a liaison between the WJHTC and federal, state and local Government agencies, industry, and academia. During her career with the FAA, Ms. Davis has also served as the Grants Officer for the FAA Centers of Excellence (COE) Program and has a passion for connecting the future aviation workforce to the FAA's mission.

Ms. Davis holds a B.S. in Marketing Management and Research from the University of Maryland, College Park. She currently resides in Manahawkin, New Jersey with her husband and two sons.

NATIONAL INSTITUTE OF AEROSPACE PROGRAM TEAM



Douglas Stanley
NIA President/CEO



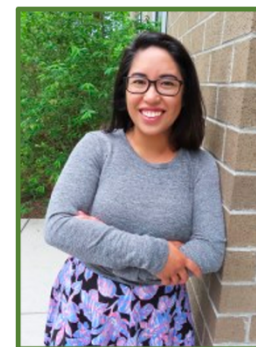
Shelley Spears
Program Director



Shannon Verstynen
Program Manager



Peter McHugh
FAA Programs Director



Genevieve Ebarle
Challenge Coordinator

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Steering Committee Members



Edward "Ed" Marciano, FAA Challenge Chairman – Federal Aviation Administration *Electronic Engineer, Next Generation (NextGen) Concepts and Systems Integration Branch*



Mr. Edward Marciano is an Electronic Engineer for the Next Generation (NextGen) Concepts and Systems Integration Branch of the Federal Aviation Administration's William J. Hughes Technical Center (WJHTC). In his role, Mr. Marciano brings 40 years of FAA service in support of the FAA's planning, development, test and evaluation, implementation, and sustainment of the air traffic control systems used in all FAA domains. Mr. Marciano has spent the past 20 years of service focusing on the NextGen Air Transportation System for Class A airspace. Additionally, Mr. Marciano was on detail as the FAA WJHTC Laboratory Integration Lead. During this assignment, he was the lead technical representative for several multi-discipline WJHTC teams. These teams focused on topics that included the integration of Department of Defense Unmanned Aircraft Systems (UAS) into the National Airspace System (NAS). The use of NextGen implemented technologies to reopen arrivals on runway 29 at Liberty International Airport. Operational suitability of NASA developed Terminal Sequencing and Spacing (TSAS) time-based operations. The UAS test team was a recipient of the Department of Transportation Secretary's Team Award in 2015.

In his previous assignments, Mr. Marciano served as a manager, test director, or program management office technical lead for the following FAA acquisition programs. Host Computer System, Tower Computer Control Complex/Remote Terminal Radar Approach Control, Initial Sector Suite System, the Display Channel Complex Rehost, Standard Terminal Approach Replacement System, and Automated Radar Terminal System color display. Throughout his career with the FAA, Mr. Marciano has sought to make the WJHTC a better place to work. As a Manager, Mr. Marciano initiated chapters of the Federal Women's Program and the National Organization for Women. Mr. Marciano currently serves on the WJHTC Employee Engagement Team.

Mr. Marciano holds a B.S. degree in Electrical Engineering from Drexel University. During his personal time, he and his wife are "Puppy Raisers" for The Seeing Eye foundation: a not-for-profit organization that provides service guide dogs for the visually impaired. Edward and his wife Laura have been married for 35 years.

Dr. Kenneth Allendoerfer – Federal Aviation Administration *Manager, Human Factors Branch*



Dr. Kenneth Allendoerfer is the manager of the Human Factors Branch at the Federal Aviation Administration William J. Hughes Technical Center. The branch conducts human-centered research and development in the areas of air traffic control (ATC), traffic flow management, technical operations, and unmanned aircraft systems with a goal of increasing aviation safety and improving human-system performance. Dr. Allendoerfer has led human factors activities supporting many of the major ATC automation and communication systems used today nationwide, including the Standard Terminal Automation Replacement System (STARS). His research focuses on developing effective human-machine interfaces, helping users manage data-intensive environments, and improving the interactions between humans and highly automated systems.

Outside of work, Dr. Allendoerfer is deeply involved in improving educational opportunities in his community. He is an FAA Aviation STEM ambassador and speaks regularly to schools and community groups about aviation and research. He is the lead organizer and coach for the Odyssey of the Mind creative problem-solving program in his hometown, Collingswood, New

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Jersey, and President of the Board of Trustees of the Collingswood Public Library. He is an active member of the Human Factors and Ergonomics Society and a part-time lecturer at Rutgers University in experimental psychology.

He holds a B.A. in Psychology from Carleton College, an M.A. in Psychology from SUNY Buffalo, and a Ph.D. in information Science and Technology from Drexel University.

Armando Gaetano – Federal Aviation Administration

Flight Program Liaison, Laboratory Services Division



Mr. Armando Gaetano is the Flight Program Liaison for the Laboratory Services Division. He coordinates and provides subject matter expertise in support of Research, Development, Test and Evaluation programs requiring flight testing. Previous to this assignment, Mr. Gaetano led the R&D Flight Test Program, a highly diverse and experienced team of Pilots, Engineers, Technicians, and Aircraft Mechanics, for over ten years. The team's mission was to maintain, modify, and operate six flight test aircraft in support of Agency programs requiring airborne testing. These programs included Microwave Landing Systems (MLS), Traffic Collision and Avoidance Systems (TCAS), and Global Positions Systems (GPS).

Mr. Gaetano holds an M.S. Degree in Mechanical Engineering from Villanova University. He had been a certified Flight Engineer and holds a Patent based on his work with the U.S. Navy. He is especially proud of being selected for the White House 1999 Closing the Circle Award presented by Vice President Gore.

Jerome Johnson – Federal Aviation Administration

Architect, Office of Administrator for NextGen



Mr. Jerome Johnson is an Architect for the ANG Division of the federal Aviation Administration's William J. Hughes Technical Center (WJHTC) and also serves in the US Army Reserve as an Engineer Officer. Mr. Johnson began his federal career at the FAA William J. Hughes Technical Center in Atlantic City, New Jersey, in November 2016. Jerome analyzes ways to introduce technology and innovation into the workplace through renovation. His responsibilities have included providing architectural design and consultation services to support WJHTC programs through project coordination and scheduling within budget to satisfy the project objectives and building tenants.

Prior to joining the FAA, Mr. Johnson worked with the United State Army Corps of Engineers (USACE) in Fort Shafter, HI. As a service member, Mr. Johnson has provided operational support in the following countries as an architect to further base camp development and the sustainment of life safety for US Soldiers, US Embassy, Coalition and NATO Forces, and Foreign Nationals: South Korea, Kuwait, Iraq, and the Republic of the Marshall Islands. He has managed small design teams aiding in the completion of design, renovation, maintenance and repair, and existing condition reports for a variety of projects. Mr. Johnson holds a Master of Architecture first professional degree from Hampton University.

During his personal time, volunteers locally in Atlantic County, with the American Engineering Science Robotic Academy (AESRA) and with the FAA Aviation Science, Technology, Engineering, and Math (AvSTEM) Program to introduce career opportunities aligned with a student's personal interest. He mentors students and soldiers pursuing civilian and/or military careers in Science Technology Engineering and Math (STEM) pass the collegiate level. For fun, Jerome enjoys the random adventures of solo-traveling and fine dining. He currently resides in Galloway Township.

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Steering Committee Members



Dr. James Jones – Massachusetts Institute of Technology Lincoln Laboratory *Technical Staff, Air Traffic Control Systems Group*



Dr. James Jones is Technical Staff in the Air Traffic Control Systems Group at MIT Lincoln Laboratory. He currently serves as the principal investigator on a number of aviation-related projects, developing advanced technology and prototypes. His current efforts lie in the areas of weather-related air traffic management, commercial space vehicle integration and advanced air mobility concepts. During his time at Lincoln, he has also worked on aircraft collision avoidance, trajectory-based operations and military airlift planning applications. He has a Ph.D. in Civil and Environmental Engineering from the University of Maryland with a focus in aviation operations research. Prior to completing his Ph.D., James worked at Northrop Grumman where he developed algorithms for airborne surveillance and tracking systems on the EA-18G and P-8 aircraft.

Lauren Rainier – Federal Aviation Administration *Safety and Occupational Health Specialist*



Ms. Lauren Rainier is a Safety and Occupational Health Specialist for the Federal Aviation Administration at the William J. Hughes Technical Center. She has been with the FAA since 2018, initially as an intern with the Pathways Internship Program. She has discovered her passion in providing people comfort and safety throughout their lives.

Along with maintaining the health and safety of the employees at the Technical Center, Ms. Rainier is the Secretary of the Southern New Jersey Field Federal Safety & Health Council. This council consists of local federal employees, safety, and health professionals who collaborate to improve safety and health in the federal government. She is also a member of the NJ Medical Reserve Corps. In 2020, Ms. Rainier became the Lead of the WJHTC's Employee Engagement Team.

Ms. Rainier holds a B.S. from Stockton University. During her free time, she likes to go to the beach, read, and travel. Ms. Rainier has goals to change the world for the better in even the slightest way. She currently resides in Smithville, New Jersey with her cats Autumn and Herbie.

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Martin Seuch – Federal Aviation Administration

Operational Integration and Test Strategic Coordinator, Air Traffic Systems Test and Evaluation Services



Mr. Martin Seuch serves as the Operational Integration and Test Strategic Coordinator in the Air Traffic Systems Test and Evaluation Services Division at the FAA William J. Hughes Technical Center. As a senior technical staff member, he supports the Federal Aviation Administration's (FAA) Next Generation Air Transportation (NextGen) vision for Trajectory Based Operations (TBO). He serves as a Subject Matter Expert (SME) liaison between the FAA (test teams, program offices, etc.), other partners, and contractor personnel in order integrate and test National Airspace System (NAS) enterprise capabilities and services, as well as identifying enterprise risks and associated mitigation.

Mr. Seuch managed and led the Test Fielded Systems Team in the En Route and Oceanic Second Level Engineering Group in the Program Management Organization. His teams supported the successful operational integration of the En Route Automation Modernization (ERAM) system at all twenty Air Route Traffic Control Centers (ARTCCs) across the National Airspace System (NAS). Mr. Seuch began his 32-year career in the United States Air Force as a RADAR Technician and then later as an Air Traffic Control Specialist. He served with honor and was awarded the prestigious Lt General Gordon A. Blake Aircraft Save Award for his extraordinary dedication to duty and application of knowledge in the field of Air Traffic Control.

Dr. Anthony Tvaryanas – Federal Aviation Administration

Manager, Aerospace Medical Research Division, Civil Aerospace Medical Institute



Dr. Anthony Tvaryanas is the manager of the Aerospace Medical Research Division at the Federal Aviation Administration's Civil Aerospace Medical Institute (CAMI). The division conducts basic and applied research in the biomedical, biodynamics and survivability/cabin safety sciences with the goal of enhancing crewmember, passenger, and air traffic control specialist health, safety, and performance in current and forecasted future civilian aerospace operations.

Dr. Tvaryanas has nearly 30 years of experience in aerospace and occupational medicine serving in clinical, research, and management positions. He served 24 years in the U.S. Air Force, starting his career as an operational flight surgeon. He transitioned to research and development at the Air Force Research Laboratory, where he led multiple projects addressing human systems integration challenges related to the adoption of unmanned aircraft systems. Later research explored the application of big data analytics and techniques to very large, combined operational and healthcare datasets to inform operational risk-based decision making. In 2017, he left the government and worked in the commercial sector as a senior scientist and program manager for an operational focused life sciences research program. Dr. Tvaryanas returned to the government in 2019, when he joined the FAA at CAMI.

He holds a B.S. in Chemistry from the George Washington University, an MPH&TM from Tulane University, an M.D. from the Uniformed Services University of the Health Sciences, and a Ph.D. in Modeling, Virtual Environments, and Simulation from the Naval Postgraduate School.

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Ralph Venuto – Federal Aviation Administration

Computer Scientist, Communications Section of Lab Maintenance



Mr. Ralph Venuto started working for the FAA through the Intern Pathways Program in 2017 during his senior year of undergraduate studies. Later that year, he graduated from Stockton University with a degree in computer science. He currently works at the William J. Hughes Technical Center, in the communications section of lab maintenance as a computer scientist.

Mr. Venuto and his team support various testing activities in the labs as well as installing, modifying, and configuring computer systems, computer networks, and digital voice communications systems. He has solely developed multiple web applications that support lab maintenance for data management such as an inventory management system, and a system for submitting, approving and recording system changes. When away from work, Mr. Venuto enjoys many hands-on activities, including but not limited to building DIY home improvement projects, spending time with his dog Vanna, and playing chess and puzzle games.

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Featured Guest Speakers



Lyndsay Digneo – Federal Aviation Administration

Program Manager, Aviation Science, Technology, Engineering, and Math (AvSTEM) Program



During her 17 years at the Technical Center, Ms. Lyndsay Digneo has managed several laboratory environments, led research efforts for emerging aviation weather capabilities, conducted test and evaluation for several aviation weather programs, and collaborated with representatives from other government agencies as well as industry and academia. She is an original member of the FAA Technical Center's AvSTEM program since its formation in 2015, and her participation has been instrumental in building the program's framework. As the AvSTEM Program Manager, she collaborates with educators and subject matter experts across the FAA and aerospace industry to develop aviation focused lessons to complement mathematics and science curriculum standards. Additionally, Ms. Digneo serves as an outreach ambassador and encourages students from elementary school through college to explore aviation related career fields.

Throughout her career, Ms. Digneo has worked with nationally recognized engineering programs including Rowan University as a member of the Electrical and Computer Engineering External Advisory Board and The Ohio State University's Center for Aviation Studies through the FAA's Center of Excellence for General Aviation.

Prior to joining the FAA, Ms. Digneo attended Drexel University, where she received a M.S. in Electrical Engineering in 2008. She also attended Rowan University and received a B.S. in Electrical and Computer Engineering in 2004.

Nikolai Drigal – Pacific Northwest National Laboratory

Software Engineer, Electricity Infrastructure and Buildings Division



Mr. Nikolai Drigal is a software engineer for Pacific Northwest National Laboratory (PNNL) in the Electricity Infrastructure and Buildings (EI&B) Division.

Mr. Drigal was the team lead representing the University of Texas at Arlington (UTA) in the 2020 FAA Challenge: Smart Airport Student Competition. UTA's Project, called "WheelTrip, the accessible travel companion" focused on improving the passenger experience for older adults at airports. WheelTrip was a finalist in the 2020 FAA smart airport competition and won \$10,000 in the UTA Mavpitch entrepreneurship competition. With the winnings from mavpitch, the WheelTrip team made an algorithm for indoor navigation leveraging bluetooth low energy (BLE) beacons.

At PNNL, Nikolai is using his unique expertise in working with multidisciplinary teams in social science and engineering by tackling problems in energy equity and energy justice with demand response programs. In addition to demand response, Nikolai is also working on projects in advanced controls, robotics, and appliance safety.

Nikolai Drigal earned his BA in Psychology at Texas Tech and MS in Industrial Engineering at UTA. In his free time, Nikolai enjoys exploring the Pacific Northwest's various national parks and playing Dungeons and Dragons, where he plays a gnome.

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Featured Guest Speakers



Brandon Graham – National Institute of Aerospace

Deputy Director of Communications and New Ventures, Smart Airport Aviation Partnership



Mr. Brandon Graham is the Deputy Director of Commercialization & New Ventures for the Smart Airport Aviation Partnership, a public private initiative dedicated to the advancement of Aviation technology and the regional aviation economy.

Over the past 6 years as a Stanford trained University Innovation Fellow, Mr. Graham has launched internationally recognized entrepreneurship programs and shared Design Thinking with over 4000 students and first-time founders in 14 countries.

**2022 FAA Challenge: Smart Connected Aviation
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Challenge Teams**



GENERAL AVIATION CATEGORY



"R.I.P.S.: Runway Incursion Prevention System"

Student Team Members: Griffin Weathers (Lead), Raha Maxwell (Co-Lead), Cameron Ray, Ellis Woodyard, Jordan Williams, Julian Payne Dillard, Kailyn Hyman, Kiuma Muchira, Montá Williams, Jr., Myles Divinity

Faculty Advisors: Prof. Andrew Smith, Prof. John Murray



**OKLAHOMA STATE
UNIVERSITY**

"Squawk ForeFlight"

Student Team Members: Garrison Grimaud (Lead), William O'Hare, Kamron Dildy, Zachary Pennington

Faculty Advisors: Dr. Matt Vance

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Challenge Teams**



EMERGING OPERATIONS CATEGORY



**MORGAN
STATE UNIVERSITY**

“A Simulation of a Real-Time Cloud-Based Communication Bluetooth Low Energy (BLE) System in Automatic Dependent Surveillance-Broadcast (ADS-B) for Unmanned Aerial Systems (UAS)”

Student Team Members: Jeremiah Conway (Lead), Mohamed Bah, Olalekan Asaolu, Lionel Thierry Fossi Tapong

Faculty Advisors: Dr. Oludare Owolabi, Dr. Kofi Nyarko, Dr. Neda Baziyar Shourabi



“Advanced Air Mobility as an Electric Grid Demand Response Asset”

Student Team Members: Nicholas Gunady (Lead), Seejay Patel, Sai Mudumba, Akshay Rao, Ethan Wright

Faculty Advisors: Dr. Daniel DeLaurentis, Dr. ShaoShuai Mou