Counter-Unmanned Aircraft System (CUAS) Capability for Battalion-and-Below Operations

Committee

Albert A. Sciarretta

Chair

Mr. Albert A. Sciarretta, PE, is President of CNS Technologies, Inc. In this position, he works primarily as an independent consultant, supporting various DoD organizations in assessing the military benefits of new technologies. For more than 30 years, as a U.S. Army officer (Lieutenant Colonel, retired) and civilian contractor, he has used his operational, research and development, operations research, and human performance assessment experience to assess the military benefits of advanced technologies and develop technology investment strategies. For the past 20 years, a significant amount of this time has focused on designing and executing Army, OSD, and DARPA wargames, experiments, and demonstrations; utilizing combinations of live-virtual-constructive simulations to represent joint through tactical urban operations. For the DoD Test and Evaluation / Science and Technology (T&E/S&T) Program, he has served more than 14 years as a subject matter expert for advanced test technologies. A recent T&E/S&T task required him to develop a “use case” for identifying counter unmanned aircraft system (CUAS) test instrumentation needs. He also serves as a Senior Research Fellow in the National Defense University (NDU) Center for Technology and National Security Policy (CTNSP), where he assesses future warfighting system capabilities. He recently developed course content for an NDU course on prototyping and experimentation (P&E), including blocks of instruction on defining P&E, experimental design, and a case study focused on CUAS experimentation. He published a CTNSP technology paper on micro-autonomous air/ground systems for dismounted infantry squads.

Mr. Sciarretta has a B.S. degree in general engineering from the U.S. Military Academy, and dual M.S. degrees in mechanical engineering and operations research from Stanford University. He previously served as a member of six National Academies Committees, including committees on Army Unmanned Ground Vehicle Technologies and Making the Soldier Decisive on Future Battlefields. He is currently a member of the National Academies Board on Army Science and Technology (BAST).

Julie A. Adams

Member

Dr. Julie A. Adams is professor of computer science and computer engineering at Vanderbilt University. Dr. Adams develops human-robot interaction (HRI) and distributed artificial intelligence methods resulting in robot systems for real-time mission deployment in dynamic environments. Her research in artificial intelligence develops distributed coalition formation and task planning algorithms for distributed robots and focuses on capabilities for humans to supervise and task large, heterogeneous robot teams and understand robot-provided information (supporting human decision making and situation awareness). She previously served on the NRC's Committee on Mainstreaming Unmanned Undersea Vehicles into Future U.S. Naval Operations, NASA Technology Roadmap: Robotics, Communication and Navigation Panel and on the Panel on Soldier Systems. She received a B.S. in computer science from Siena College and a Ph.D. in computer and information systems from the University of Pennsylvania.

Frederick R. Chang

Member

Dr. Frederick R. Chang, NAE, is the director of the Darwin Deason Institute for Cyber Security, the Bobby B. Lyle Endowed Centennial Distinguished Chair in Cyber Security, and professor in the Department of Computer Science and Engineering in the Lyle School of Engineering at Southern Methodist University (SMU). He is also a senior fellow in the John Goodwin Tower Center for Political Studies in SMU's Dedman College, and a distinguished scholar in the Robert S. Strauss Center for International Security and Law at the University of Texas at Austin. Dr. Chang's career spans service in the private sector, in academia, and in government, including as the former director of research at the NSA. Dr. Chang has been awarded the NSA Director's Distinguished Service Medal and was the 2014 Information Security Magazine 'Security 7' award winner for education. He has served as a member of the Commission on Cyber Security for the 44th Presidency and as a member of the Computer Science and Telecommunications Board of the Academies. He has also served as a member of the Academies' Committee on Responding to Section 5(d) of Presidential Policy Directive 28: The Feasibility of Software to Provide Alternatives to Bulk Signals Intelligence Collection. He twice served as a cyber security expert witness at hearings convened by the U.S. House of Representatives' Committee on Science, Space and Technology. Dr. Chang received his B.A. from the University of California, San Diego, and his M.A. and Ph.D. from the University of Oregon. He has also completed the Program for Senior Executives at the Sloan School of Management at the Massachusetts Institute of Technology (MIT).

James Freebersyser

Member

Dr. James A. Freebersyser is Director of Advanced Systems at BBN Technologies. In this position, he leads business development efforts for external funding of new technology development, primarily at the Defense Advanced Research Projects Agency (DARPA), and transition of existing technology efforts, including technical concept development, market strategy, and business planning.

Prior to joining BBN, Dr. Freebersyer was the Technology Portfolio Manager, Navigation, Communications, and Control (NCC) Directorate at Honeywell. Dr. Freebersyer also worked as a Program Manager at the Defense Advanced Research Projects Agency (DARPA) - Advanced Technology Office on detail from the Army Research Laboratory. He received his B.S.E. in Electrical Engineering from Duke University, an M.S. in electrical engineering from the University of Virginia; and a Ph.D. in electrical engineering from North Carolina State University. Dr. Freebersyser is also a member of the Board on Army Science and Technology.

James S. Humbert

Member

Dr. J. Sean Humbert is the McLagan Endowed Associate Professor of Mechanical Engineering at the University of Colorado – Boulder. Previously, he was the Techno-Sciences Associate Professor of Aerospace Engineering Innovation in the Department of Aerospace Engineering at the University of Maryland. Dr. Humbert’s research interests include bio-inspired robotics, estimation, and control theory, with applications to Unmanned Aircraft Systems (UAS) and Autonomous Underwater Vehicles (AUVs). Recent work has focused on the flight mechanics and distributed sensing and estimation approaches in small-scale organisms, including insect-based perception and navigation in cluttered, uncertain environments. Best paper honors include the AIAA Conference on Guidance, Navigation, and Control, the American Control Conference, and the International Conference on Insect Sensors and Robotics. Dr. Humbert is an AIAA Associate Fellow, has recently won the AIAA National Capital Section Hal Andrews Young Scientist/Engineer Award, and is the recipient of an ARO Young Investigator Award. He is Director of the MAST-CTA on Microsystem Mechanics, Co-Director of the AFOSR Center of Excellence on Nature Inspired Flight Technologies, and is the Director of the Autonomous Vehicle Laboratory at the University of Maryland. He is also a member of the Board on Army Science and Technology.

Dr. Humbert holds a BS degree in mechanical engineering from the University of California, Davis, and MS and Ph.D. degrees in mechanical engineering from Caltech.

Paul Kolodzy

Member

Dr. Paul Kolodzy is an independent consultant at Kolodzy Consulting, LLC. He has worked on a wide variety of technologies including software defined radios, cognitive radios, and Advanced Wireless Service. Dr. Kolodzy also has experience in spectrum use and the research and development of new methods to access the radio frequency spectrum for consumer, commercial, scientific, and government applications. Dr. Kolodzy also has significant experience with sensor technologies including acoustic, UV, infrared, and laser radar systems. He has served on the Committee on a Survey of the Scientific Use of the Radio Spectrum, Committee to Study Wireless Technology Prospects and Policy, and the Committee on a Survey of the Active Scientific Use of the Radio Spectrum.

Terry P. Lewis

Member

Dr. Terry P. Lewis is a Site Executive and Senior Systems Engineer, at the Raytheon Company. He also has a wide base of expertise encompassing communications, electronic warfare, and cybersecurity that will benefit this committee. In addition, Dr. Lewis has developed anti-tampering technologies to prevent or reduce the ability of potential adversaries or competitors to reverse-engineer critical U.S. communications technologies. He is a Raytheon Fellow and received the Most Promising Engineer of the Year award at the 2002 Black Engineer of the Year Award Conference. Dr. Lewis is a member of the Naval Studies Board and the Panel on Assessment and Analysis at the Army Research Laboratory, and has served on the Committee on Distributed Remote Sensing for Naval Undersea Warfare and the Committee on Examination of the Air Force Intelligence, Surveillance, and Reconnaissance (ISR) Capability Planning and Analysis (CP&A) Process.

Todd D. Murphey

Member

Dr. Todd D. Murphey is a Professor at the Neuroscience and Robotics Lab at Northwestern University, where his research focuses on computational methods in dynamics and control with applications in neuroscience, robotics, and automation. Dr. Murphey’s research group focuses on computational models of embedded control, biomechanical simulation, dynamic exploration, and hybrid control. The mathematical approaches used by the group lead to many orders of magnitude improvement in computational efficiency for reliable real-time implementation. Applications include assistive exoskeleton control, stabilization of energy networks, bio-inspired active sensing, entertainment robots, and robotic exploration.

Gabriel M. Rebeiz

Member

Dr. Gabriel Rebeiz, NAE, is a Distinguished Professor at the University of California, San Diego. His expertise includes design of silicon RFICs for microwave and millimeter-wave systems with a specialty on phased arrays and low power circuits, active and passive imaging systems up to THz frequencies (including thermal imagers), THz CMOS and SiGe electronics, RF micro-electro-mechanical systems (RF MEMS), reconfigurable front-ends including tunable filters and tunable antennas, cognitive radios, planar antennas from RF to THz frequencies, radars, and collision avoidance systems for automotive applications. He will be a valuable contributor when addressing the challenge of finding small UAS in cluttered and complex environments.

Michael A. Vane

Member

LTG Michael A. Vane, U.S. Army, retired, is an Independent Consultant. Previously, he was Group Vice President, Training and Intelligence Solutions, DynCorp International, a leader of approximately 5,000 employees globally serving areas of training, intelligence and special operations forces roles to DoD and DoS customers. LTG Vane has expertise in training and intelligence solutions with standards, certifications and delivery methods to meet customer needs. He managed multiple programs worth over $500 million annually for a diverse customer set. Prior to DynCorp, LTG Vane was an Executive Advisor at Booz Allen Hamilton where his responsibility was to advise in the capability area of Analytics in DoD markets – specifically working on requirements development, Live-Virtual-Training analysis to improve home station training, improved costing and readiness models, and institutional transformation.

Before retiring to civilian life, General Vane served as the Deputy Commanding General, Futures/Director of the Army Capabilities Integration Center (ARCIC) at the U.S. Training and Doctrine Command (TRADOC). In his 36-year Army career, he has served as the Vice Director, J8, Force Structure, Resources and Assessments; Commanding General, U.S. Army Air Defense Center at Fort Bliss, TX; Deputy Chief of Staff for Doctrine, Concepts and Strategy at TRADOC; Commanding General 32nd Army Air and Missile Defense Command; and Director of Integration, Deputy Chief of Staff for Operations and Force Development. He is also a member of the Board on Army Science and Technology.

LTG Vane received a B.S. in general engineering from U.S. Military Academy at West Point, and an M.S. in systems technology from the U.S. Naval Postgraduate School.

R. Vijay Kumar

Member

Dr. Vijay Kumar, NAE is the Nemirovsky Family Dean at the School of Engineering at the University of Pennsylvania. Dr. Kumar's research group works on creating autonomous ground and aerial robots, designing bio-inspired algorithms for collective behaviors, and on robot swarms. His expertise in collaborative and swarming robotic operations make him particularly well-suited to address the study sponsor’s main point of concern. Dr. Kumar’s selection for NAE membership was for “contributions in cooperative robotics, networked vehicles, and unmanned aerial vehicles, and for leadership in robotics research and education.” Dr. Kumar served on Panel G: Human Exploration Systems and Mobility and Autonomous Systems and Robotics under the Committee for the Review of NASA's Capability Roadmaps.