



WHAT'S NEXT?? UMASS ZOOM SUMMIT: AEROSPACE, DEFENSE, UNDERSEA TECHNOLOGY AND REMOTE SENSING

The [University of Massachusetts](https://www.umass.edu) is pleased to extend an [invitation](#) to a “zoom summit” in Aerospace, Defense, Undersea Technology and Remote Sensing on **January 26, 2021 from 3:30-5:00 pm**. In the first half hour, we will introduce industry leaders, their colleagues in business strategy and government relations, to some of the most important breakthroughs of recent years in **five key fields** listed below.

In the final hour, we invite you to discuss **grand challenges** that will shape aerospace, defense, undersea technology and remote sensing in the next decade. Our most accomplished scientists, from across the five campuses of the University of Massachusetts, will be on hand to discuss the most pressing translational questions in the post-COVID period.

Major research breakthroughs (30 minutes):

Cybersecurity (including AI and Autonomy)

Reinforcement learning in automated cyber defense such as DARPA Cyber Grand Challenge.
Digital forensics to reduce internet-based crimes against children.

Human-performance sensing (augmentation), equipment, and systems integration

Evaluation of exoskeletons and other wearable system for DoD via NERVE/Movement Assessment Lab Center
Human Robot Systems Lab

Space, small satellites, aircraft and unmanned aerial vehicle borne sensors, space and undersea environment

- PICTURE-C high-contrast imaging; SPACE HAUC satellite high-bandwidth space-to-ground communications. USAF DSX killer electrons that can pose a hazard to the health of astronauts and satellites. SuperCam on Mars 2020, will study Martian soil using LIBS.
- NASA Earth’s environment satellite missions improve climate, environmental modeling and the impact of ecosystem disturbance.
- Drone imagery, ground-based LIDAR, and other observing tools test strategies for coastal resilience.
- Monsoon prediction for better naval situational awareness. Undersea wake detection, Bernoulli pad, acoustic transducers and arrays in maritime sensors
- Underwater sensing systems and next-generation long-mission UAVs driven by machine-learning and robotics.
- Acoustics, signal processing, novel materials, information dominance and AI

Multi-domain awareness

- HEROES Researchers Efforts: a) distributed sensing elements and its algorithm for large infrastructure monitoring. b) Asset Management: water and food sensing to measure contaminants c) Standoff detection of agents, integrated on UAVs
- DARPA Young Faculty Award and continuing research on novel miniaturization technologies for communication and sensing antennas/apertures
- Internet of Battlefield Things (IoBT) DoD Army Research Laboratory Collaborative Research Alliance funded at \$25M for five years

Multifunctional, high-performance materials, sensors for multi domain operation and challenging environments

- Thermoresponsive, fire-retardant, antimicrobial, insect-repelling fabric
- Materials for ballistic and blunt impact protection materials: design & modeling, material performances, control of manufacturing using distributed sensing.
- Chem-bio protection: material development and sensing
- Stand-alone power harvesting systems
- Stimuli responsive and self-healing materials
- Cold Spray Research
- “Engineer our Future” national Materials Genome Initiative
- Additive manufacturing of highly solids loaded structure (long range precision fires, architected catalysts, biomedical scaffolds, precision medicine)
- Fiber alignment in helmet protection, processing-induced failure prediction, gradient adhesives

Grand Challenges (60 minutes):

Our most accomplished researchers will be on hand for a back-and-forth discussion of these five pressing problems. We will foreground where we’re going in these domains, but are curious to learn, is this where you are headed? Are there other directions to consider?

Breakout group 1: Real-time autonomous cyber operations

- Software development (Dev), security (Sec), and IT operations (Ops): Automated software engineering pipelines to rapidly deliver new functionality, while ensuring it preserves essential properties such as reliability and security.
- Convergence of artificial intelligence and integration with social sciences and public policy.

Breakout group 2: Humans-machines-teams-systems Integration, Human Augmentation and monitoring

- Development, evaluation and deployment of human augmentation systems and endurance, shared situation awareness across multi-human-robot teams, Human monitoring and prediction of performance over long term along for actionable data
- Human centered mechatronic technologies, human language technologies
- Active sensing for predictive augmentation and increased human understanding of exoskeleton activity

Breakout group 3: Pervasive awareness and monitoring

- Remote sensing: Meeting the high contrast imaging needs for applied science and defense using satellites and UAVs.
- Swarms: Incorporation of modern antenna, communication technology to meet the demands of UAV and satellite constellations
- Electromagnetic spectrum dominance in multi-domain operation

Breakout group 4: Exploration in challenging environments

- Predicting space weather: A comprehensive monitoring program using simultaneous multi-platform (ground, UAV and satellite-based) and multiple diagnostics tools to increase the reliability of space weather predictions
- Ocean and terrestrial mapping, modeling, spectral and hyperspectral imaging
- Autonomy for exploration through cooperation, coordination and Swarm; Ocean X
- Explore technology and strategies for improved coastal resilience: Stone Living Lab

Breakout group 5: Adaptable next-gen materials and manufacturing for challenging environments; materials genome

- Lightweight, adaptable multifunctional materials for protection, maneuver and sustainment (power, communication) in challenging environments
- Resilient precision manufacturing and rapid transition to products for DoD and space exploration. Point-of-use manufacturing at deployment

Register here: <https://www.eventbrite.com/e/aerospace-defense-undersea-technology-and-remote-sensing-registration-133132513933>