

WORLD-CLASS EXPERTS UNITE TO CREATE

THE INSTITUTE OF TRUSTED SPACE SYSTEMS

Society will increasingly depend on space assets. There are about 2,500 spacecraft currently in orbit. This number will significantly increase as OneWeb and others begin to launch spacecraft to provide global internet broadband service to individual consumers.

There are two fundamental changes in how space assets will operate in the near future:

1. Global connectivity will be achieved through spacecraft constellations, not individual spacecraft.
2. Spacecraft operations must proceed autonomously without human intervention.

These changes will require trust in space assets. The new Institute of Trusted Space Systems will apply world-class expertise and facilities to ensuring our future spacecraft and operations are secure and dependable.

Issue: Space systems that have been (and are currently being) built with little consideration for cyber and physical threats are at risk and may no longer be trustworthy.

Critical Challenge: New development and operations approaches are needed that ensure the trustworthiness (including security and dependability) of spacecraft components, subsystems, and overall systems and combine these systems with distributed artificial intelligence.

- » Requires expertise and experience in satellite design, satellite operations, networking, cybersecurity, intelligent systems, autonomy, and cyber-physical systems

Goal: Solve the hardest problems in space systems security and dependability to ensure robust, reliable, and trustworthy operations

- » Multidisciplinary research on new approaches for trusted space systems security and dependability
- » Safe, secure, reliable, and agile systems for manned and unmanned missions

Approach: Create an Institute for Trusted Space Systems (ITSS)

- » The Johns Hopkins University Applied Physics Laboratory (APL) and University of Maryland, Baltimore County (UMBC) are partners and co-leads in this endeavor
- » Seeking potential US Government and commercial space industry partners and sponsors



WHAT WE OFFER

UMBC Expertise

Significant AI and Data Science Expertise

- » Multiagent systems, machine learning, vision, knowledge representation and reasoning, human-robot interaction, and securing cyber-physical systems

Strong Cybersecurity Leadership

- » UMBC is designated by the National Security Agency and Department of Homeland Security as a Center of Academic Excellence for both Research and Education through the Center for Information Security and Assurance.
- » Cyber Incubator at bwtech@UMBC Technology Park with over 50 start-up companies in cyber areas

UMBC Center for Cybersecurity

- » 30+ interdisciplinary faculty in cybersecurity research—expertise in economics and public policy; strong graduate program
- » ONR-supported cybersecurity research partnership with the US Naval Academy
- » IBM-supported Accelerated Cognitive Cybersecurity Laboratory advances cybersecurity and machine learning
- » Northrop Grumman-supported Cyber Scholars program promotes women and underrepresented minorities to become cyber experts

National Cybersecurity FFRDC

UMBC and the University of Maryland, College Park, are partners with MITRE on the NIST-funded National Cybersecurity FFRDC.

Three Long-Term Cooperative Centers with NASA Goddard

- » **Center for Space Sciences and Technology:** Supports more than 50 scientists and staff
- » **Goddard Planetary Heliophysics Institute:** Supports more than 30 research faculty and scientists
- » **Joint Center for Earth Systems Technology:** Supports more than 40 research faculty

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APL Expertise

Nation-Leading Space Exploration Capabilities

- » Created satellite navigation (the Transit system was the precursor to GPS)
- » Built and launched 68 spacecraft (with Parker Solar Probe in progress)
- » More than 320 sensors and payloads in development and flown
- » 150 science grants in progress continuously
- » Trusted-agent role in support of NASA, the National Oceanic and Atmospheric Administration, the Department of Defense, and the Intelligence Community

Extensive Cyber Operations Experience

- » Approximately 500 staff focused on all aspects of cyber
- » Numerous special facilities and test beds
- » Deep connections to key sponsors throughout the government
- » Sought-after thought leadership in a variety of areas

Significant Intelligent Systems Skills and Facilities

- » Deep expertise in autonomy, artificial intelligence, multiagent systems, and machine learning

For more information, contact:

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