Division of Academic Affairs
SCHOOL *of* BUSINESS AND TECHNOLOGY
Department of Engineering and Aviation Sciences

Capability Statement

Overview:

The University of Maryland Eastern Shore (UMES) is a Historically Black University and the 1890 Land-Grant institution for the State of Maryland. UMES is a doctoral degree grant research institution and a member of the University System of Maryland. UMES holds a Carnegie Classification of Institutions of Higher Education.

Research Capabilities:

The research capabilities of the faculty in the Department of Engineering and Aviation Sciences can be summarized in the following three areas pertaining to Army content relevant Research

- **Information Sciences**: Our faculty engage in research in the field of remote sensing and radar imaging; Signal and information processing of sensor data; Electromagnetic Sensing and Acoustic Wave Sensing; Guidance, navigation, and control; Stochastic modeling of complex systems; Differential games and predictive analysis; Perception and cognition for tactical missions such as cooperative games; and Applications in unmanned systems control and operations.
- **Computational Sciences**: Computational fluid dynamics, High performance computing by parallel computing; Deep neural networks and deep learning for radar change detection; High performance multi-core systems, especially reconfigurable optical network on chip architecture;.
- **Engineering Sciences**: Micro and nanoscale transport system, lab-on-a-chip technology, 3D printing technology, MEMS lab technology.

Facilities:
List major instrumentation, laboratory's, centers, etc.

Motion and Robotics Laboratory - design and test of robotics, autonomous navigation systems for control, guidance, and navigation.

Electromagnetic Anechoic Chamber - Antenna testing and radar cross section measurement in the range of 1 GHz to 28 GHz.
Aerospace Lab - A 15 feet long educational wind tunnel to study aerodynamics
Statics/Materials Lab - testing, stress and strain measurement and analysis for various materials
MEMs Lab – equipped with scanning electron microscope, to design, produce, and test microelectromechanical systems and devices
Unmanned Systems Lab - design and testing of small unmanned aerial systems for operation and engineering.

Past Performance:

The faculty in the Department of Engineering and Aviation Sciences has engaged in cutting edge research supported by various funding agencies such as NASA, the National Science Foundation, The Army Research Laboratory, the Office of Naval Research, The Air Force Research Laboratory, and NASA. A list of selected past and on-going projects are given as follows:

- Project title: "Ultrasonic Wireless Sensor Networks for Structural Health Monitoring", NASA STTR Phase I and Phase II, 2017-2018, and 2018-2020.
- Project title: "Optimal feedback guidance in multi-player co-operative games: applications for unmanned systems' trajectory planning and control", funded by Air Force Research Lab, summer 2016
- Project title: "Sparsity Aware Adaptive Radar Sensor Imaging in Complex Scattering Environments", funded by Army Research Office/Army Research Lab. 2011-2015
- Project title: "Acquisition of an Acoustical Measurement System for Structural Health Monitoring Research and Teaching at University of Maryland Eastern Shore", funded by NSF. 2011-2014.
- Project title: "Research Initiation Award: Ouroboros-Investigation of Dynamic Reconfigurable Optical Network-on-Chip Architectures". Funded by NSF. 2015 – 2017.
- Project title: "AIRSPACES: Aerial Imaging and Remote Sensing for Precision Agriculture and Environmental Stewardship", funded by NASA/Maryland Space Grant Consortium. 2015-2016.