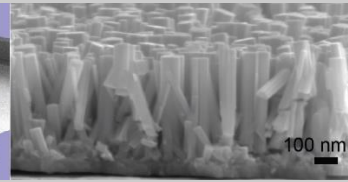
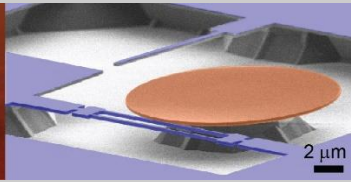
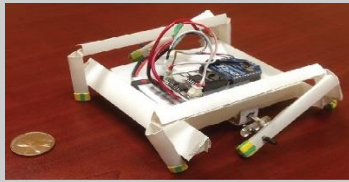




# WPI

## MECHANICAL ENGINEERING



## Emerging Technologies for Autonomous Terrain Vehicle and Space Payload Systems: Research, Development, Education

**Lee Moradi and Vladimir Vantsevich**

The University of Alabama at Birmingham

**11:00am -12:00 pm, Wednesday, May 5th**

**Zoom Link:** <https://wpi.zoom.us/j/93607536066>

In collaboration with the U.S. Army Ground Vehicle Systems Center (GVSC), NASA, other Government and Intergovernmental Agencies and Organizations and industry, the Autonomous Vehicle Mobility Institute (AVMI) Program and EITD intent to provide the U.S. leadership in research, development, and academic education among the NATO nations by

- Contributing to the development of the New-Generation Combat Vehicle,
- Contributing to payload, habitation modules, and autonomous rovers for space research and exploration.

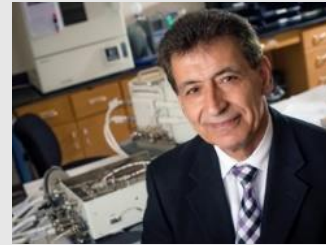
AVMI/EITD supports the U.S. Army GVSC, NASA, industry with basic and applied research that is integrated with vehicle system and platform prototyping, engineering design, and development. Through this activity, AVMI/EITD serves as the national research lab hub for the collaboration between the U.S. Army GVSC, the Automotive Research Center's universities, and other universities and U.S. research agencies, international professional and intergovernmental organizations, including NATO, and private industry.

The seminar presents an overview of the AVMI/EITD research projects on creating transformative technologies for autonomous terrain vehicle mobility and maneuver, including coupled and interactive dynamics of vehicle systems with active morphing payloads, vehicle mechatronics and intelligent physical systems, open architecture/modular systems, agile tire/terrain dynamics, new proprioceptive sensors and exteroceptive sensor fusion, and AI-based controls and decision making. All projects contribute to the design of a Simulator of Autonomous Mobility that is planned as comprehensive hybrid simulation and experimental facility for autonomous vehicle mobility and maneuver. An overview of the EITD research and development projects for the International Space Station is also presented. The projects include design, development, assembly, verification testing, flight integration, flight support, and payload recovery and maintenance for the Cold Stowage group at NASA Johnson Space Center.

Based on the experience gained through the AVMI/EITD research and development activities, the seminar presents a vision for integrating research, development, and education processes and, thus, establishing a self-sustained and competitive Autonomy Research and Technology Institute.

### About the Speakers

**Dr. Lee Moradi** has extensive experience managing the activities within Engineering &



Innovative Technology Development (EITD) and the School of Engineering. His most recent

work involves development of highly efficient cryogenic and freezer technologies for rapid freezing and preservation of science samples on the International Space Station. His current contract with NASA is capped at \$48.3M. His other areas of expertise include analysis, design, test, verification, and management of complex systems and programs for DoD, DoE, Nuclear, Rail, and Automotive industries.

**Vladimir Vantsevich, ScD, PhD, ASME Fellow**

is a professor in the UAB Department of



Mechanical Engineering (Secondary app. is in the ECE Dept.) serves as Director and PI of the Autonomous Vehicle Mobility Institute Program. His research and engineering area is

mechanical and intelligent mechatronic multi-physics systems, system modeling, design, and control. His recent work on autonomous vehicles is on coupled and interactive dynamics of vehicle systems, agile tire dynamics, virtual drivelines for electric and hybrid vehicles, protection of vehicle sensors from cyber-threats, and AI-based autonomous vehicle mobility, maneuver, and energy efficiency.