Unmanned Aerial Systems Research
In 2012 Nevada began a robust effort to secure the FAA designation as one of six UAS test sites. On December 30, 2013 Nevada was designated as an official test site. This has spawned a renaissance in the UAS industry as manufacturers extend their vision beyond the military market to national and international commercial applications including a wide variety of new platforms and sensor technologies.

UAS systems have entered the civilian market due to demand for many industry needs. This expanded use has in turn increased the demand for research in UAS manufacturing; sensor developers and operators; and applied research and development capabilities.
Why UNLV?
The State of Nevada, and in particular Clark County, already has in place several assets necessary for developing and sustaining the growth demanded by the UAS industry. These assets include:
• A wide and expansive restricted airspace system in which large-scale experiments and testing can be conducted
• A large number of experienced personnel expanding their application of UAS for national defense systems
• A strong and relevant curriculum offered by UNLV
• A well-developed educational outreach program necessary for workforce enhancement

November 2016
Faculty Involved in Unmanned Aerial Systems Research

Dr. Yahia Baghzouz  
Professor, Department of Electrical and Computer Engineering  
Co-Director, Center for Energy Research

Dr. Yi-Tung Chen  
Professor, Department of Mechanical Engineering  
Co-Directory, Center for Energy Research

Dr. William Culbreth  
Associate Professor, Department of Mechanical Engineering

Mr. Jonathan Daniels  
Adjunct Scholar, Department of Mechanical Engineering

Dr. Laxmi Gewali  
Chair and Professor, Department of Computer Science

Dr. Sarah Harris  
Associate Professor, Department of Electrical and Computer Engineering

Dr. Juyeon Jo  
Associate Professor, Department of Computer Science

Dr. Si Jung “SJ” Kim  
Assistant Professor of Entertainment Engineering and Design

Dr. Yoohwan Kim  
Associate Professor, Department of Computer Science Technology (CICT)

Dr. Shahram Latifi  
Professor, Department of Electrical and Computer Engineering  
Director, Center for Information and Communications

Dr. John Minor  
Associate Professor, Department of Computer Science

Dr. Brendan Morris  
Assistant Professor, Electrical and Computer Engineering

Dr. Venkatesan Muthukumar  
Associate Professor, Department of Electrical and Computer Engineering

Dr. Paul Oh  
Lincy Professor of Unmanned Aerial Systems, Department of Mechanical Engineering

Dr. Brendan O'Toole  
Chair and Professor, Department of Mechanical Engineering

Dr. Darrell W. Pepper  
Professor, Department of Mechanical Engineering  
Director, Nevada Center for Advanced Computational Methods
Faculty Involved in Unmanned Aerial Systems Research

Dr. Emma Regentova
Associate Professor, Department of Electrical and Computer Engineering

Dr. Ebrahim Saberinia
Associate Professor, Department of Electrical and Computer Engineering

Dr. Haroon Stephen
Assistant Professor, Department of Civil and Environmental Engineering

Dr. Peter Stubberud
Professor, Department of Electrical and Computer Engineering

Dr. Mohamed Trabia
Professor, Department of Mechanical Engineering
Associate Dean for Research, Graduate Studies & Computing, College of Engineering

Dr. Evangelos Yfantis
Professor, Department of Computer Science

Dr. Woosoon Yim
Professor, Department of Mechanical Engineering
UAS Minor and Certificate Program Coordinator
Unmanned Aerial Systems

Research Highlights
Unmanned Aerial Systems Research

Dr. Yahia Baghzouz

Professor, Department of Electrical and Computer Engineering
Co-Director, Center for Energy Research
Phone: (702) 895-0887
Email: Yahia.Baghzouz@unlv.edu

• Research Interests
  • Electrical systems
  • Electric motors
  • Battery power supply
  • Fuel-cell power sources
  • Super-capacitor hybrid systems
  • Regenerative braking systems
  • Power conditioning
  • Control systems
Dr. Yi-Tung Chen
Professor, Department of Mechanical Engineering
Co-Director, Center for Energy Research
Phone: (702) 895-1202
Email: Yitung.Chen@unlv.edu

• Research Interests
  • Computational fluid dynamics
  • Fluid-structure interaction
  • Smart wing design
  • Aircraft maneuver
  • Aerodynamics
  • Biomimic simulation
Dr. William Culbreth
Associate Professor, Department of Mechanical Engineering
Phone: (702) 895-3426
Email: William.Culbreth@unlv.edu

• Research Interests
  • Development of alpha and neutron detection devices for use on UAVs
  • Wireless engine speed controller design for alternative UAV fuels
  • Development of a single-rotor UAV that counteracts engine torque by using deflection of the flow
  • Indoor autonomous navigation of UAVs using ultrasonic distance sensors and accelerometer data
  • Aerodynamics and wing deflection of high-aspect ratio UAV airfoils under loading

Unmanned Aerial Systems Research
Mr. Jonathan Daniels
Adjunct Scholar, Department of Mechanical Engineering
UAS Committee Member, ASTM F38
Email: jon.daniels@unlv.edu

- Research Interests
  - Human Factors and Ergonomics (HF&E)
    - Engineering psychology and human performance
  - Privacy practices for UAS operations
  - Unmanned aircraft pilot training
  - Certification for other UAS crew members
- Systems Integration and Engineering
  - Aircraft airworthiness, conformity, and quality assurance
  - Flight test and evaluation
  - Multi-modal robotics
  - Transportation engineering (airports and flight parks)

Unmanned Aerial Systems Research
Dr. Laxmi Gewali
Professor and Chair,
Department of Computer Science
Phone: (702) 895-4028
Email: Laxmi.Gewali@unlv.edu

- Research Interests
  - Trajectory planning for UAS
  - Covert path planning and threat modeling
  - Sensor assisted target recognition
  - Monitoring and surveillance

Unmanned Aerial Systems Research
Unmanned Aerial Systems Research

Dr. Sarah Harris
Associate Professor,
Department of Electrical and Computer Engineering
Phone: (702) 895-1341
Email: Sarah.Harris@unlv.edu

- Research Interests
  - Digital design, reconfigurable computing
  - System on a chip design
  - Embedded systems
  - Robotics, interfacing sensors, actuation
Dr. Juyeon Jo
Associate Professor,
Department of Computer Science
Phone: (702) 895-5873
Email: Juyeon.Jo@unlv.edu

- Research Interests
  - Cybersecurity in UAS control software and ground systems
  - UAS communication network security
  - UAS privacy protection schemes
  - Software engineering in UAS system development
Unmanned Aerial Systems Research

Dr. Si Jung “SJ” Kim
Assistant Professor, Entertainment Engineering and Design
Digital Experience (DEx) Lab
Phone: (702) 895-3699
Email: Si.Kim@unlv.edu
Website: http://www.unlverc.com

• Research Interests
  • Human factors and human-computer interactions in UAS
  • User interactions and user interface issues in UAS
  • Design and applications of user experience with UAS

The Flying Orchestra: Aerial robotic musical instruments providing novel user experience in live entertainment
Unmanned Aerial Systems Research

Dr. Yoohwan Kim
Associate Professor,
Department of Computer Science
Phone: (702) 895-5348
Email: Yoohwan.Kim@unlv.edu

- Research Interests
  - UAS privacy technologies
  - UAS control and navigation software
  - Secure and reliable communications
  - Protection against cyber attacks
Dr. Shahram Latifi
Professor, Department of Electrical and Computer Engineering
Director, Center for Information and Communications Technology (CICT)
Phone: (702) 895-4016
Email: Shahram.Latifi@unlv.edu

- Research Interests
  - Search and rescue technologies
  - Geolocation of RF emitters
  - UAS system health monitoring
  - UAS data acquisition and management
Unmanned Aerial Systems Research

Dr. John T. Minor
Associate Professor,
Department of Computer Science
Phone: (702) 895-3715
Email: john.minor@unlv.edu

• Research Interests
  • Self-guiding/intelligent UAVs
  • Swarm intelligence models
Unmanned Aerial Systems Research

Dr. Brendan Morris
Assistant Professor,
Department of Electrical and Computer Engineering
Phone: (702) 774-1480
Email: Brendan.Morris@unlv.edu

- Research Interests
  - On-board computer vision and image processing
  - Object detection and recognition
  - Selective filtering
  - Surround awareness
  - Sense and avoid technology
Unmanned Aerial Systems Research

Dr. Venkatesan Muthukumar
Associate Professor,
Department of Electrical and Computer Engineering
Phone: (702) 895-3566
Email: venkatesan.muthukumar@unlv.edu

• Research Interests
  • Development of adaptive guidance, navigation and control (GNC) algorithms for UAVs
  • Embedded Control Design using multi-core processors and reconfigurable hardware
  • On-board multi-sensor fusion, hardware acceleration of UAV tasks, altitude and flight control algorithms
  • Hardware in the loop testing of GNC algorithms
Unmanned Aerial Systems Research

Dr. Paul Oh
Lincy Professor of Unmanned Aerial Systems
Director, Drones and Autonomous Systems Lab
Professor and ASME Fellow
Department of Mechanical Engineering
Phone: (702) 895-0168
Email: paul.oh@unlv.edu

- Research Interests
  - Unmanned aerial vehicles
  - Autonomous systems
  - Robotics
  - Humanoids
Unmanned Aerial Systems Research

Dr. Brendan O’Toole
Professor and Chair,
Department of Mechanical Engineering
Phone: (702) 895-3885
Email: Brendan.Otoole@unlv.edu

• Research Interests
  • Composite materials design & analysis
  • Composite fabrication
  • Resin infusion
  • Static/dynamic material characterization
  • Autonomous and R/C systems
Unmanned Aerial Systems Research

Dr. Darrell W. Pepper
Professor, Department of Mechanical Engineering
Director, Nevada Center for Advanced Computational Methods
Phone: (702) 895-1056
Email: Darrell.Pepper@unlv.edu

- Research Interests
  - Aerodynamics
  - Computational Fluid Dynamics (CFD)
  - Drag reduction techniques
  - UAV design and fabrication
  - Flight testing
  - Application of thin-film solar for UAVs
Unmanned Aerial Systems Research

Dr. Emma Regentova
Associate Professor,
Department of Electrical and Computer Engineering
Phone: (702) 895-3187
Email: Emma.Regentova@unlv.edu

• Research Interests
  • Camera-based leader tracking and adjusting flight parameters
  • On-board calculation of the 3D position of the Leader’s relative speed, pitch, yaw and roll angles for following Leader’s path.

Dr. Venkatesan Muthukumar
Associate Professor,
Department of Electrical and Computer Engineering
Phone: (702) 895-3566
Email: Venkatesan.muthukumar@unlv.edu

System flow
Detect Track Adjust
System flow
Initial pose Position change After alignment

November 2016
Unmanned Aerial Systems Research

Dr. Ebrahim Saberinia

Associate Professor,
Department of Electrical and Computer Engineering
Phone: (702) 895-3169
Email: Ebrahim.Saberinia@unlv.edu

- Research Interests
  - Wireless communication systems and signal processing
  - Localization
  - Communication security
  - Sense and avoid algorithms
  - Privacy and blanking
  - Multiple vehicle networking
  - Sensors
Dr. Haroon Stephen

Assistant Professor,
Department of Civil and Environmental Engineering and Construction
Director, GIS and Remote Sensing Core Lab
Phone: (702) 774-1463
Email: Haroon.Stephen@unlv.edu

• Research Interests
  • Sensors aboard UAS for remote sensing: testing and applications
  • UAS and GIS integration
  • Applications of UAS to resource mapping, monitoring, and management
  • Data fusion and data mining of multi-scale sources: UAS, Aerial, and Spaceborne sensors

Unmanned Aerial Systems Research
Unmanned Aerial Systems Research

Dr. Peter Stubberud
Professor,
Department of Electrical and Computer Engineering
Co-Coordinator Entertainment Engineering and Design
Phone: (702) 895-0869
Email: Peter.Stubberud@unlv.edu

• Research Interests
  • Communication systems including direct conversion receivers
    communication circuits
  • Radar systems delta sigma modulators
  • Signal and image processing
  • Adaptive signal processing
Unmanned Aerial Systems Research

Dr. Mohamed Trabia
Professor, Department of Mechanical Engineering
Associate Dean for Research, Graduate Studies & Computing
Phone: (702) 895-0957
Email: Mohamed.Trabia@unlv.edu

• Research Interests
  • Micro UAV design
  • UAV dynamic analysis
  • UAV control

Conceptual diagram for a figure-8 flapping wing for a UAV

Wind tunnel testing of UAV wing
Unmanned Aerial Systems Research

Dr. Evangelos Yfantis
Professor, Department of Computer Science
Phone: (702) 895-3536
Email: Evangelo.Yfantis@unlv.edu

• Research Interests
  • Digital video
  • Video compression
  • Pattern recognition
  • Artificial intelligence
  • Signal processing
  • Statistics
  • Database management
  • File servers-network programming
  • Digital communications-internet programming

Video capture, compression, and pattern recognition card, with PCI and PCI express data buses

8-layer video capture, compression, and pattern recognition card, with PCI and PCI express data buses
Dr. Woosoon Yim
Professor, Department of Mechanical Engineering
Coordinator of Minor in UAS Program
Phone: (702) 895-0956
Email: Woosoon.Yim@unlv.edu

- Research Interests
  - UAS technology development for GPS denied environments
  - Radiation contour mapping and localization
  - Aerial manipulation

Unmanned Aerial Systems Research

Contour Mapping of Radiation
- Gradient Estimation and Source Localization
  - Source(s) estimation by the UAS swarm
  - Multi-source mapping
  - Sensor network outfitted on the UAS swarm

Aerial Manipulator for in-situ Sampling
- Dynamic balancing mechanism

Swarms and Swarms
College of ENGINEERING