



UCF

# FACULTY RESEARCH TALKS

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Zoom talk | Friday, March 18, 2022 | Noon to 1 p.m.



PRESENTER 1:

## JAN GOU

Professor,  
Mechanical and  
Aerospace Engineering,  
Center for Advanced  
Turbomachinery and  
Energy Research

### Ultra-High Temperature Composite Thermal Protection Systems in Extreme Environments

In recent years, there has been growing research interest in developing new lightweight heat shields for planetary entry and hypersonic vehicles. In this talk, Dr. Gou will discuss the buckypaper as a reinforcement of carbon nanotube-based composite materials for heat shield applications. The polymer decomposition, heat transfer, gaseous flow, and residual modulus of ablative composite materials with the buckypaper heat shield under high heat fluxes have been predicted and further validated with experiments. He will also discuss future research directions for ultra-high temperature composite thermal protection systems in extreme environments.

Dr. Gou's research focuses on synthesis, processing, characterization, testing, and modeling of composite materials and structures. His research has been associated with three UCF research centers, including CATER, FCAAP, and FAA COE CST. His work has been consistently funded by NSF, NASA, FAA, ONR, AFRL, ACS PRF, FSGC, FHTCC and industries, including Space Florida, JST Power Equipment, Momentive Performance Materials, and Inorganic Specialists. Dr. Gou has published five book chapters, 102 journal papers, and 115 conference papers in the field of composite materials. He is a Fellow of International Association of Advanced Materials.



PRESENTER 2:

## AMAN BEHAL

Professor,  
Electrical and  
Computer Engineering,  
Nanoscience Technology  
Center

### Assistive Robotics: Challenges and Opportunities

Nearly two-thirds of mobility device users have limitations in one or more daily activities such as grocery shopping, light housework, etc. Over the past few years, assistive robotic devices have emerged to augment the functional capacity of disabled individuals. Advanced sensing/actuation, machine learning, parallel processing, and social networking are combining to offer exciting opportunities for collaborative human-robot interaction and mixed human-robot networks for efficient propagation and sharing of skills. However, there are challenges associated with robot situational awareness, accurate transfer of user intent in the presence of sensory, motor, and/or cognitive deficits in individuals with disabilities, as well as ethical and privacy issues arising from interaction of networked robots, software agents, and people. This talk will focus on how we can take advantage of the aforementioned opportunities while overcoming these challenges.

Dr. Behal received an M.Tech degree in electrical engineering from Indian Institutes of Technology in Bombay, India, and a Ph.D. in controls and robotics from Clemson University. After a brief stint as a post-doctoral associate in bioengineering at Clemson, he joined Clarkson University in 2003 and UCF in 2006. His research interests include assistive robotics and nonlinear controls. He serves as an associate editor on the editorial board of *IEEE Transactions on Control Systems Technology*. He has previously served as an associate editor for *IEEE Transactions on Cybernetics*. He is the lead for UCF's Disability, Aging, and Technology Cluster.



PRESENTER 3:

## JOSH COLWELL

Pegasus Professor and  
Chair, Dept. of Physics  
Director, Stephen W.  
Hawking Center for  
Microgravity Research  
and Education

### Dirtball Fights in Space: Understanding Planet Formation from Microgravity Experiments and Saturn's Rings

Planetary rings are disks of gently colliding particles, prevented from accretion by tidal forces. Protoplanetary disks share many of the same properties as rings. Dr. Colwell will describe studies of Saturn's rings revealing clues to accretion in protoplanetary disks, and a varied experimental program in the Hawking Center to understand the behavior of small particles in microgravity environments with applications to planetary accretion as well as practical applications for exploration of the Moon and asteroids.

Dr. Colwell studies planet formation, asteroids, planetary rings, comets, and interplanetary dust. He was a co-investigator on the Cassini mission to Saturn and studies Saturn's rings with Cassini data. His experiments have flown on the Space Shuttle, the International Space Station, suborbital rockets, and parabolic flights. He is the author of "The Ringed Planet: Cassini's Voyage of Discovery at Saturn," and hosts "Walkabout the Galaxy," a humorous podcast exploring the latest news in astronomy and space exploration.