



ELON UNIVERSITY

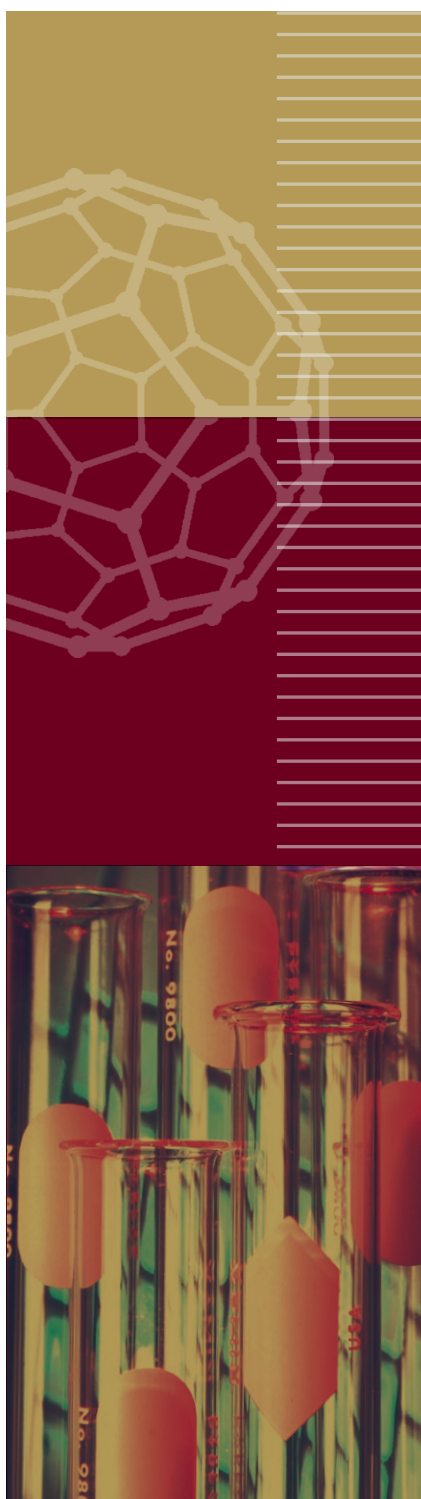
VOICES OF DISCOVERY

2016-17

Elon College, the College of Arts and Sciences, at Elon University is committed to engaging students and the community in the excitement and wonder of discovery. During the past two decades, scores of discoveries in molecular biology, atomic physics and computer technology have changed the face of science and brought dramatic changes to our world.

The Voices of Discovery speaker series brings to campus preeminent scientists and mathematicians who have left an indelible mark on the way we view the world. They share their remarkable experiences and perspectives with Elon students and the community. This series plays a fundamental role in the university's commitment to create a science-conscious community and to help students be informed citizens.

Voices of Discovery is just one element of Elon's efforts to provide outstanding science education. At the Dalton L. McMichael Sr. Science Center, students work in modern laboratories with cutting-edge research tools. They focus on discovery-based learning, undergraduate research and collaboration among the sciences, developing an appreciation for the scientific enterprise and how we acquire new knowledge.



WHEN ROCKS ATTACK: RISKS AND OPPORTUNITIES FROM NEAR-EARTH ASTEROIDS



Monday, **October 24, 2016** | McKinnon Hall | 7:00 p.m.

Dr. Thomas D. Jones

Veteran NASA Astronaut

Senior Research Scientist, Florida Institute for Human and Machine Cognition

Although our solar system seems empty, there is a lot of orbiting debris out there...not space garbage, but natural debris left over from the process of solar system formation, ranging from sizeable asteroids and comets to dust. The larger debris masses, including asteroids, are of great interest to us as sources of information about our solar system and the origin of life on Earth, and as potential sources of raw materials for use here and possibly in deep space travel and exploration. These same rocky asteroids are also a focus of attention because of past impacts with Earth and the potential for future catastrophic impacts.

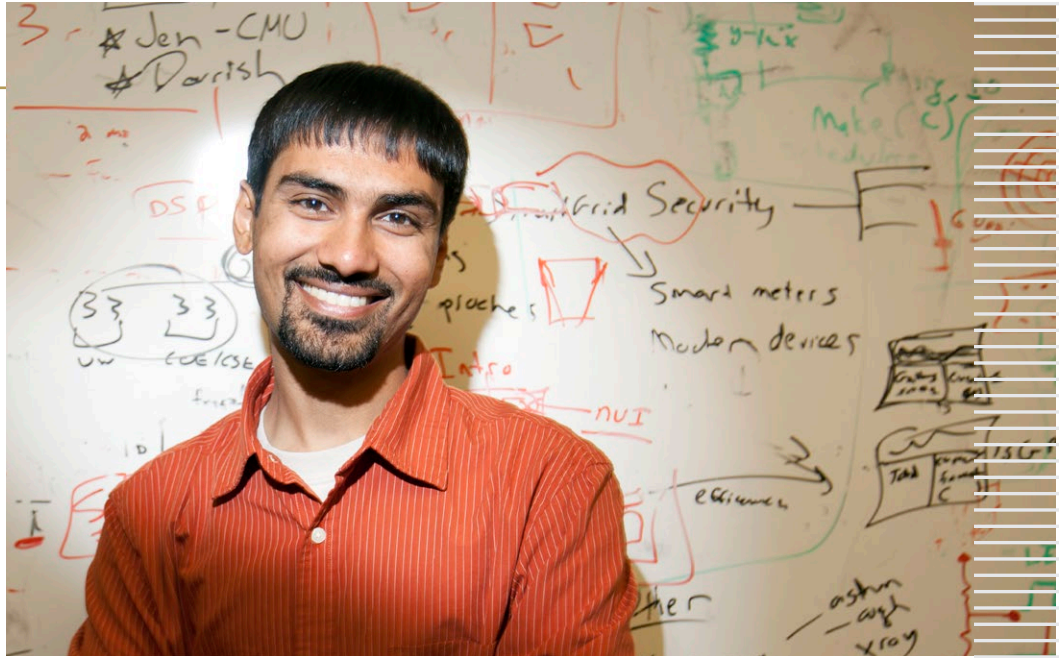
In a few years, NASA's Asteroid Redirect Mission will capture and redirect an asteroid fragment to a safe orbital around the moon to enable robotic arms to sample and study these bodies in great detail—a project with many potential spinoffs and benefits. NASA's Near-Earth Object Program coordinates efforts to identify and monitor potentially hazardous asteroids that periodically come into

Earth's neighborhood and thus pose risk to our planet.

Planetary scientist, Air Force pilot, former NASA astronaut, author and speaker, Dr. Thomas Jones has a Ph.D. in Planetary Science and his research interests have included remote sensing of asteroids, meteorite spectroscopy and uses of space resources. As a NASA astronaut, Jones flew on four space shuttle missions over the course of 11 years with achievements that included running science operations, using robotic arms to deploy and retrieve satellites and delivering and installing the U.S. Destiny Laboratory Module to the Space Station.

Dr. Jones is the author of several books about space and aviation including *Planetology: Unlocking the Secrets of the Solar System*, and *Sky Walking: An Astronaut's Memoir*. As a senior research scientist at the Florida Institute for Human and Machine Cognition, Dr. Jones consults regarding the future of space exploration, use of space resources and planetary defense.

APPLICATIONS OF COMPUTING TO HEALTH AND ENERGY



Monday, **November 14, 2016** | McCrary Theatre | 7:00 p.m.

Dr. Shwetak Patel

Associate Professor and Washington Research Foundation Entrepreneurship
Endowed Professor

Computer Science & Engineering and Electrical Engineering
University of Washington, Seattle

Imagine having access to a very detailed analysis of energy use in your home that provides appliance-specific information or having access to water use data at the fixture level. The days of receiving a conglomerate energy or water statement each month have ended as the ability to have disaggregated energy and water use data enables you, the home owner, to really understand your personal use of resources and to make decisions or changes based upon that data. This information would be obtained by sensors associated with the existing electrical and plumbing infrastructures of your home.

Imagine a mobile phone functioning as a spirometer and providing accurate information about air flow in a patient with chronic pulmonary disease, or sensors that can track mobility or activity patterns useful in home health or rehabilitation research.

Imagine a world of ubiquitous computing. In this ubicomp world, which is already here, acquiring, processing and reporting information can theoretically

happen anytime and anywhere as small embedded sensors and microprocessors provide useful information about nearly anything.

Computer scientist and entrepreneur Shwetak Patel directs the Ubicomp Lab at the University of Washington, Seattle. In recent years, his research interests have included the areas of sustainability sensing, wireless sensing and user interface technology. As Patel puts it, "The primary theme of my group's research has been to discover and build sensors and sensory systems that solve hard problems by leveraging existing infrastructures and resources."

Patel's entrepreneurial achievements include founding Zensi, Inc., a residential monitoring company and co-founding SNUPI, a wireless sensor company. Zensi, Inc. (acquired by Belkin International, Inc.) focused on making energy and water monitoring systems commercially accessible. Products such as ElectriSense and HydroSense are currently in use in the U.S.

CLOAKING LIGHT AND SOUND



Tuesday, February 28, 2017 | McCrary Theatre | 7:00 p.m.

Dr. Steve Cummer

Professor of Electrical and Computer Engineering
Duke University

The Romulan and Klingon cloaking devices of Star Trek were a source of great frustration to the crew of the USS Enterprise, and Harry Potter's treasured invisibility cloak, while imperfect, enabled Harry and friends to have many adventures, investigate and take action in the battle of good and evil.

While invisibility cloaks are still the stuff of dreams, Steve Cummer's lab and other scientists are making progress in demonstrating the ability to hide or cloak objects from electromagnetic radiation and sound waves, potentially rendering them visually or acoustically hidden to the observer.

Metamaterials are synthetic composites with repeating structure that exhibit electromagnetic properties not seen in nature and can be used to essentially bend light or sound around an object, which cloaks or hides the object from detection or observation. From military applications such as deflecting sonar from submarines or radar from planes, improving medical imaging or diverting city noise away from an apartment or office building, there are

potentially limitless applications for these technologies.

Dr. Cummer's current research is both theoretical and experimental and includes a focus on investigating how metamaterials can control electromagnetic and acoustic wave propagation. One of the greatest challenges in this field is designing and making materials that exhibit the specific structural properties needed to direct energy waves around an object. His recent work has chiefly focused on acoustic metamaterials and transformation, and his lab recently designed a system of three-dimensional, broadband acoustic cloaking.

Dr. Cummer received a Ph.D. in Electrical Engineering from Stanford and spent two years at NASA Goddard Space Flight Center as a postdoctoral research associate before joining the faculty at Duke. He has received a National Science Foundation CAREER Award, a Presidential Early Career Award for Scientists and Engineers and became a Fellow of the Institute for Electrical and Electronics Engineers (IEEE) in 2011.