Lecture Series

The University of Houston
Cullen College of Engineering

PRESENTS

Perspectives on the Grand Challenges for Engineering
- Implications for Preparing the Engineer for the 21st Century

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National Academies of Science, Engineering and Medicine,
Washington D.C.

Monday, April 23, 11:00 am – 12:30 pm
Engineering Lecture Hall, 102-D

LECTURE ABSTRACT

The NAE Grand Challenges for Engineering, announced in 2008, is a cross-disciplinary initiative whose vision is the "Continuation of life on the planet, making our world more sustainable, healthy, secure and joyful." They have captured the imagination of the global engineering community and inspired widespread support for engineering to better our world.

This effort has "Engineering System" and "Talent Building" components. The first part of the presentation will cover the history and the philosophy of the NAE Grand Challenges initiative. The Engineering System components are the specific grand challenges, which are complex, yet vital, aspirations for the planet in this century, such as reverse-engineering the brain, enhancing virtual reality, securing cyberspace, making solar energy cost-competitive, engineering better medicines, providing access to clean water for nearly a billion people who lack it, and advancing personalized learning.

The Talent-Building piece, the Grand Challenges Scholars Program (GCSP), prepares the workforce to undertake global Engineering Systems. The second part presentation will describe the GCSP and its focus on providing five competencies, namely, research/creative project experience, multidisciplinary training, business/entrepreneurial mindset, global/ multicultural understanding and social consciousness, Students with these skills sets and mindsets will be ready to be the engineers and leaders of the 21st century. GCSP is designed to ensure that there is coherence and connectivity across the five competencies under a chosen Grand Challenge theme and that the program elements are driven by the power of the idea of the 21st century engineer with flexibility afforded to institutions for execution.

SPEAKER BIOSKETCH

Ramakrishna received his Ph.D in Solid State Science from Indian Institute of Technology, Madras, India in 1982 and joined the faculty at Arizona State University in 1985 after a postdoctoral fellowship at ETH, Zurich, Switzerland. From 2011-2016, he was the Diane and Gary Tooker Professor of Materials Science and Engineering at the Fulton Schools of Engineering and a member of the Humanitarian engineering faculty at ASU till his transition to emeritus professor status 2016. He launched Arizona State University's Grand Challenge Scholars program in 2009 and was the director till 2013. He is dedicated to preparing engineers that not only have the necessary engineering skills but also the cross-disciplinary knowledge, entrepreneurial spirit, global perspective and a sense of mission needed to lead our country and the world to meet the great challenges facing humankind in the 21st century.

The research questions that he investigated lie at the crossroads of Biology and Materials Science and Engineering. He studied biological supramolecular assemblies such as proteins, membranes, and DNA that are capable of incorporating inorganic solids and precisely engineer their size, shape, and orientation at the nanometer scale. The biosensors and silicon-bio hybrid devices his lab designed span a wide spectrum of applications from mining, electronics, and health to defense.

In 2013, he was selected to be a Jefferson Science Fellow and as a cohort of 4 engineers, 4 scientists and 4 doctors, he served as a senior science and technology advisor to the Office of the Secretary of State. He helped guide US's international relations through the lens of "engineering for sustainable development" and provided intellectual, technical and strategic leadership on policies and priorities in the areas of health, education, energy, infrastructure, economic growth and governance.

In January 2017, he accepted the newly created position at the National Academy of Engineering in Washington D.C. as the Director of the Grand Challenge Scholars Program Network. The primary goal of the program is to prepare the future talent that can adequately address the challenges facing humankind in the 21st century. His main responsibilities are to broaden and deepen the impact of the program across the US and around the world by forging vibrant partnerships between universities, professional societies, industry, civil society and governments.