GUJARAT TECHNOLOGICAL UNIVERSITY

(Established under Gujarat Act No. 20 of 2007)

A Webinar Report on:

Pico/Nano/Micro-Satellites (PNMSats) - A New Paradigm for Aspiring Engineers

DATE: 01/05/2015
TIME: 4:30 PM - 5:30 PM IST
VENUE: 4th Floor, BISAG, Gandhinagar

GTU PG SCHOOL Students attended a webinar on 'Pico/Nano/Micro-Satellites (PNMSats) - A New Paradigm for Aspiring Engineers' by **Dr. Sharan Asundi** of the Aerospace Science Engineering department at **Tuskegee University**.

About Gujarat Technological University

Gujarat Technological University (GTU) is a technological university established by Government of Gujarat vides Act No. 20/2007. The university caters to the entire field of Engineering, Pharmacy, Business studies (MBA) and Computer Applications (MCA) in Gujarat.

Today the university has about 5, 00,000 plus students, 486 affiliated colleges and 17000 faculties and 68 master's program and a robust doctoral programs. The University is working with all the Colleges to sensitize them to the need for high quality of education.

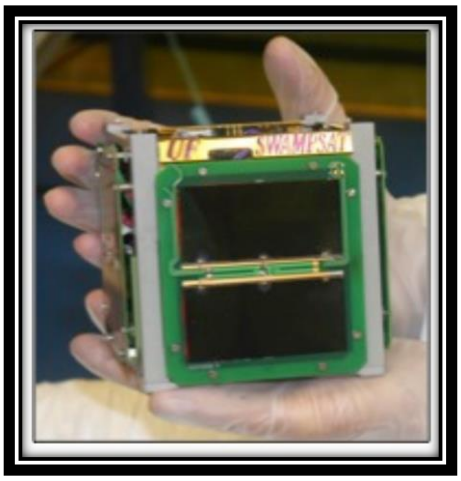
GTU has the largest sensitization and support programs in IPR, Innovation, Start-ups & co-creation activities and internationalization. It has fourteen PG Research Centers and Schools in the advanced field of Technology and Policy Research. It is today the largest University in Gujarat.

About Sharan Asundi

Sharan Asundi is an Assistant Professor in the Aerospace Science Engineering department at **Tuskegee University**, which is the first and only historically black institution of higher learning to offer an accredited BS degree program in this field. He has collaborated with NASA Goddard Space Flight Center to conduct research in the field of small satellites. He is actively pursuing support from NASA, AFRL, NSF and other organization supporting research in aerospace. Most recently, he has proposed (to NSF) to develop a 6U CubeSat in collaboration with University of Florida, NASA and Maryland Aerospace Inc to advance the understanding of upper atmospheric composition. He has sought funds from AFRL to set up a magnetic coil test facility at Tuskegee University to research the design and development of magnetically clean compact satellites. Rockwell Collins has approved funding to develop an Amateur Ground Station at Tuskegee University.

Abstract of the webinar:

PNMSats have transformed the way we perceive satellites and made space accessible to budding engineers, scientists and amazingly, even high school students. PNMSats are playing a pivotal role of complementing conventional satellites and in effect, contributing significantly to workforce development for the space industry. PNMSats' system design and development is truly multidisciplinary engineering involving Aerospace Engineering, Mechanical Engineering, Electrical, Electronics and Communication Engineering, Computer Science and Engineering, Structural and Thermal Engineering, Systems Engineering and more.



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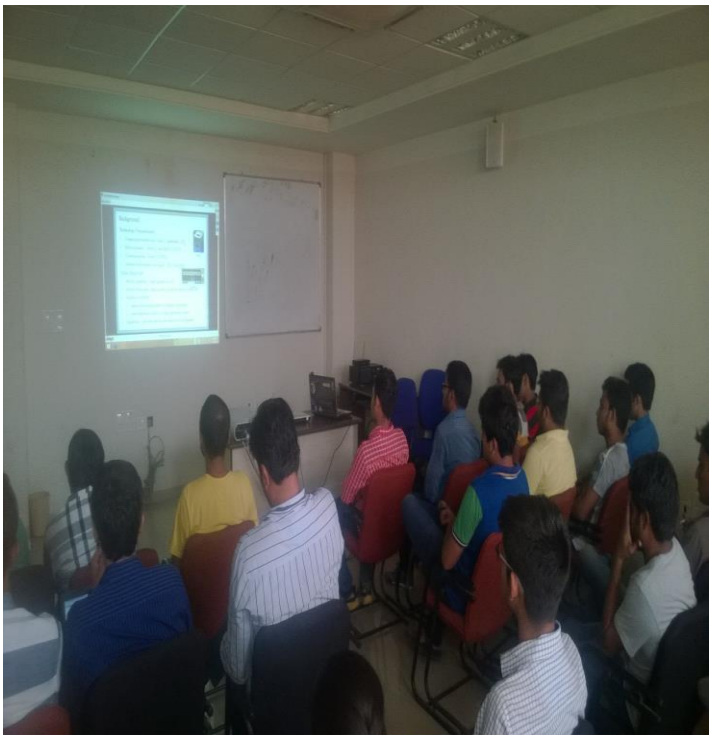
The focus of the talk by Sharan Asundi is to highlight the relevance of engineering disciplines to PNMSat missions and encourage the current generation of engineers to seek **diverse careers.** In particular, the talk described the presenter's involvement and contribution in a **Picosatellite mission at University of Florida**, which was launched out of **National Aeronautics and Space Administration's (NASA's)** Wallops Flight Facility. **The use of** a systems engineering approach, developed based on guidelines of NASA Systems Engineering Handbook, for the design and development of PNMSats is described. Its relevance in general to any engineering activity is highlighted. **The mission payload**, a precision three axes attitude control system for PNMSats is briefly discussed. Its intent to demonstrate rapid retargeting and precision pointing, which could serve tasks such as space based disaster monitoring are briefly presented. **The role** of attitude determination system, its design, development and characterization are discussed. **The attitude stabilization system**, consisting of embedded magnetic coils in the solar panels, is briefly described. The accommodation of commercial-off-the-shelf (COTS) in the system engineering approach is presented through the electrical power system components. As part of the solution to address limitations imposed by the PNMSat form factor and mass specifications, the distributed computing architecture of the command and data handling system, its design and development are discussed. **The design and development** of the structural chassis to house the CubeSat is discussed. The two components of communication – ground and space – are discussed. As part of the communication system discussion, the ground segment is particularly emphasized. The relative ease of setting up an amateur ground station is discussed and students are encouraged to explore in this regard. The presentation showcases a virtual and physical assembly of the picosatellite mission and described how institutions with limited resources could design a complete satellite and realize a virtual assembly and testing. The presentation identifies some of the utilities demonstrated by PNMSats in the past and some of the potential utilities under development. Last but not the least, the talk intendes to motivate the engineering academia and industry to seek enterprising diverse careers by involving themselves in PNMSat missions.



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