**An Overview of Intelligent System Design using Smart Material based Sensors and Actuators: Current Experiences and Future Possibilities.**

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**ABSTRACT**: With the advent of Internet of Things (IOT) and Wireless Sensor Networks (WSN), smart material-based sensors and actuators are becoming ubiquitous today. While retaining the traditional fields of application in Large Space Structure and automobile systems equipped with integrated vehicle health monitoring (IVHM), a range of new applications of such sensors and actuators are coming up today. In this talk, I'll begin with our explorations in the development of Pipe Health Monitoring Robots for health monitoring of gas pipe-lines. It is observed that for long distance in-pipe robots, haptic sensors are less data intensive than video-based systems. Hence, smart material-based touch sensors are readily used for such applications. This will be followed by another novel application of smart actuators in active shape control for smart antenna systems. Next, I will discuss about our current works on energy harvesting system design for river health monitoring. Finally, I'll touch the base on the development of axon like smart actuators that can be used for long range selective signal transmission which may find applications in neuromorphic cognitive system design.

**Biography**

Dr. Bishakh Bhattacharya is a Professor of Mechanical Engineering department and professor and Head of Cognitive Science in the Indian Institute of Technology Kanpur (IITK). His area of research includes: Active and Passive Vibration Control, Structural Health Management, Design of Energy Harvesting System, Intelligent System Design and Child-Robot Interaction Design. Based on his work on Shape Memory Actuator, a new technology is developed for shape control of reconfigurable flexible parabolic antenna system for the Indian Space Research Organization (ISRO). Another notable application of his work on Structural Health Management is in developing Energy Harvesting Pipe Health Monitoring robots for the Gas Authority of India (GAIL).

Among other activities, he served as the Head of the Design Programme at IIT Kanpur from 2011-2013. He is currently coordinating the Space Technology Cell of the Institute. He has also developed and in charge of the Smart Materials and Systems Laboratory. He is the recipient of Drs. G. D. Mehta and V. M. Mehta Chair Professor in the Institute. Dr. Bhattacharya had received best scientist award from the Systems Society of India and recipient of Sakura Fellowship in the area of Brain inspired Robotics. He is in the editorial boards of International Jl. of Systems Science and Engineering, Jl. of Low Frequency Noise and Vibration Control and ISSS Jl. of Micro and Smart Systems. He seats in the Systems panel of the Aeronautical Research and Development Board of India.