

Can Magnetic Microsystems/Nanomagnetics Enable Powering of Internet of Things?

*(Under GIAN, Global Initiative on Academic Network, Ministry of Human Resources, Govt. of India)
July 19, 2016 –August 1, 2016, Jawaharlal Nehru University (JNU), New Delhi*

Overview

Within an environmentally conscious and energy efficient world, MEMS energy harvesting devices converting mechanical energy out of ambient vibrations in to electrical power promise in principle, a cleaner and almost perpetual solution to powering small systems and microsystems such as wireless sensors, avoiding the use and subsequent waste generation out of polluting batteries. This provides an opportunity of reliably powering these sensors with non-conventional energy sources such as mechanical vibrations through electromagnetic transduction. In the context of recent worldwide (various Corporate as well as Government) hype/quest of relevant technologies for 'Internet of things', 'Smart Cities & Environment', this area of research has potential to bring paradigm shift particularly in the area of required energy landscape of billions of connected autonomous sensors for monitoring the wellbeing of health and the environment in the coming decades. In the present series of talks principle of vibrational energy harvesters through electromagnetic transduction, novel MEMS/magnetic MEMS designs, fabrication methodologies based on linear to nonlinear dynamics employing micro-hard-magnets and results achieved at Tyndall National Institute and at various other leading research groups across the world will be highlighted.

On the other hand the demand for efficient conversion and management of generated low power and overall size miniaturization, is forcing the electronic passive components to operate at higher frequencies, become more integrated and more suitable for automated, batch fabrication. Recently soft magnetic cores integrated onto Silicon or PCB as micro-transformers/micro-inductors, are receiving considerable attention particularly for decreasing the overall profile and increasing the power conversion efficiency of dc-dc switch mode power supplies (SMPS). In the present series of talks the cutting edge technological need and breakthroughs achieved at Tyndall National Institute and at various other leading research groups across the world in the area of micro-transformers/micro-inductors with nano softmagnetic cores on Silicon aiming 'power supply on chip' will be discussed.

Course participants will learn these topics through lectures and hands-on experiments. Also case studies and assignments will be shared to stimulate research motivation of participants.

Modules

A: MEMS Energy Harvesting Devices : July 19 - July 25

B: Micro-inductor, Microtransformer & Nanomagnetic Materials : July 26 - August 1

Number of participants for the course will be limited to fifty.

You Should Attend If...	<ul style="list-style-type: none"> ▪ you are an electronics/computer engineer or research scientist interested in the area of MEMS ▪ you are physicist or mechanical engineer interested to learn microsystem implementation technology ▪ you are a student or faculty from academic institution interested in learning how to do research on Microsystem or want to work with MEMS applications.
Fees	<p>The participation fees for taking the course is as follows:</p> <ul style="list-style-type: none"> • JNU PhD/MTech/MPhil Students and Faculty: INR 1000 • Students from other recognized educational institutions: INR 1000 • Faculty from other recognized educational institutions: INR 2000 • Members of Government Research Organizations: INR 5000 • Members of Industry/Private Research Institution: INR 10,000 • Participants from abroad: US \$500 <p>The above fee includes all instructional materials for tutorials and assignments, laboratory equipment usage charges.</p>

The Faculty



Prof Saibal Roy, has built a research activity at Tyndall National Institute, Ireland, which exemplifies both scientific excellence and strategic commercial impact particularly targeting energy harvesting and power conversion for miniaturized ICT devices/systems, employing magnetics and engineered magnetic nanostructures.



Dr. Poonam Agarwal is Assistant Professor of Jawaharlal Nehru University, New Delhi. Her Research interests are: RF MEMS, BioMEMS, emphasis on development of MEMS fabrication technologies.

Course Co-ordinator

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