



**AICTE Training and Learning (ATAL) Academy  
sponsored  
Online Faculty Development Programme  
on**



# **"MEMS Technology & Microsensors"**

**July 26-30, 2021**



**Organized by:**

**Department of Electronics & Communication Engineering  
National Institute of Technology Meghalaya  
Bijni Campus, Laitumkhrah, Shillong 793003, Meghalaya**

**Course Coordinator(s):**

**Dr. Pradeep Kumar Rathore & Dr. Akhilendra Pratap Singh**

## **PATRON**

Prof. Bibhuti Bhusan Biswal, Director, NIT Meghalaya

## **ADVISORY COMMITTEE**

Prof. Ayon Bhattacharjee, Dean (Faculty Welfare)

Prof. Gayadhar Panda, Dean (Academics)

Dr. Harish Chandra, Dean (Student's Welfare)

Dr. Gitish K. Dutta, Dean (Research & Consultancy)

Dr. C. Marthong, Dean (Planning & Development)

## **ORGANIZING COMMITTEE**

Department of Electronics & Communication Engg.

## **COURSE COORDINATOR(S)**

Dr. Pradeep Kumar Rathore

Dr. Akhilendra Pratap Singh

## **COURSE OVERVIEW**

The field of micro-electro-mechanical systems (MEMS) is an interdisciplinary area that includes design and fabrication of sensors and actuators that are capable of micron-size mechanical movements. Nowadays, the integration of MEMS technology and complementary metal oxide semiconductor (CMOS) technology is widely being exploited for the design and development of advanced Microsensors and Systems. These sensors and systems are finding widespread use in a diverse range of applications including industrial, automotive, consumer electronics, bio-medical, defence and aerospace applications. The purpose of this FDP course is to give a broad introduction to MEMS

technology, and will provide participants with necessary fundamental knowledge and experience in the design and fabrication of MEMS and Microsensors. The topics include basic sensing and actuating principles, materials, fabrication technologies and electronics for MEMS and Microsensors. The course will also cover current literature, MEMS markets and applications. The course will be a combination of theory lectures, case studies and hands-on-training sessions using MEMS simulation software.

## **COURSE OBJECTIVES**

The primary objectives of the course are as follows:

- (i) Familiarization with fundamentals of MEMS & Microsensors and their applications.
- (ii) Understand the basic working principles, fabrication techniques and materials for MEMS and Microsensors.
- (iii) Learn the techniques for integration of MEMS and Microsensors with electronic circuits and systems.
- (iv) Exposure to Intellisuite simulation software for the design and simulation of MEMS & Microsensors.

## **COURSE CONTENTS**

Fundamentals of MEMS and Microsensors and their applications, MEMS fabrication technology, Working principles of various advanced Microsensors including physical, chemical and biological sensors, Smart health technologies, Advanced Nanoscience & Nanofabrication Technologies for Sensors, Sensor interfacing with Embedded Systems, Human Values & Ethics, Hands-on-training sessions on Intellisuite MEMS Software.

### **TARGET AUDIENCE**

The course is suitable for Faculty Members, Research Scholars, PG Students and Industry Professionals.

### **ABOUT NIT MEGHALAYA**

National Institute of Technology (NIT) Meghalaya is one among the thirty NITs in India established under the NIT Act 2007 (Amended 2012) of the Parliament of India as Institutes of National Importance with full funding support from the Ministry of Human Resource Development, Government of India. The nearest railway station is Guwahati. From the railway station, one can travel by bus or shared taxi to Shillong. It takes about 3 hours to reach Shillong. After reaching Shillong, one can hire local taxi to reach the campus at Bijni Complex, Laitumkhrah.

### **ABOUT THE DEPARTMENT**

The Department of Electronics and Communication Engineering was established in 2010 with the inception of National Institute of Technology Meghalaya. The department offers B. Tech Programme with an intake capacity of thirty & M. Tech Programme with an intake capacity of twenty in Electronics and Communication Engineering and Ph.D. program in various specialized areas of Electronics and Communication Engineering. The major research areas of the department include High Speed and Low Power VLSI, Semiconductor Devices, MEMS, Computer Arithmetic, Wireless Sensor Networks, Cognitive Radio, Antenna Design and Signal Processing. The major objective of the Department is to impart high quality technical

education and research with a strong foundation in Electronics and Communication Engineering.

### **TENTATIVE LIST OF EXPERTS/SPEAKERS**

Dr. Hardik Pandya, Indian Institute of Science, Bangalore  
Dr. N.N. Sharma, Manipal University Jaipur  
Dr. Jaspreet Singh, Semi-Conductor Laboratory, Chandigarh  
Dr. B.P. Sahu, North Eastern Hill University, Shillong  
Dr. Kulwant Singh, Manipal University Jaipur  
Dr. Nitin S. Kale, Nanosniff Technologies Pvt. Ltd.  
Dr. Sripadaraja, Intellisense Pvt. Ltd.  
Dr. Peesapati Rangababu, NIT Meghalaya  
Smt. Isha Yadav, Solid State Physics Laboratory, DRDO  
Dr. Gyanendra Singh, Thapar Institute of Engineering and Technology

### **HOW TO APPLY**

No registration fee will be charged from the participants. Due to limited seats, applications will be considered on First Come First Serve basis. For registration, please visit: <https://atalacademy.aicte-india.org/signup>. For more information please visit: <https://www.aicte-india.org/atal>.

### **CONTACT DETAILS**

Dr. Pradeep Kumar Rathore, Coordinator - FDP  
Email : [pradeeprathore@nitm.ac.in](mailto:pradeeprathore@nitm.ac.in) ; Contact: 9485177062

Dr. Akhilendra Pratap Singh, Co-coordinator - FDP  
Email : [akhilendra.singh@nitm.ac.in](mailto:akhilendra.singh@nitm.ac.in) ; Contact: 9485177042

## COURSE SCHEDULE (TENTATIVE)

**INAUGURAL CEREMONY: 9:00 AM TO 9:30 AM ON MONDAY, 26 JULY 2021**

DAY & DATE	SESSION-1 (9:30 AM – 11:30 AM)	SESSION-2 (12:00 PM – 2:00 PM)	SESSION-3 (3:00 PM – 5:00 PM)
Monday, 26 July 2021	<b>MEMS Overview and Opportunities</b> (Dr. Jaspreet Singh)	<b>Flexible substrate optical studies &amp; Microscopy for biological cells</b> (Dr. Gyanendra Singh)	<b>MEMS Devices: Design and Fabrication</b> (Smt. Isha Yadav)
Tuesday, 27 July 2021	<b>Dielectrophoretic based MEMS sensing and particle separation</b> (Prof. N.N. Sharma)	<b>Smart Healthcare Technologies</b> (Dr. Hardik Pandya)	<b>Advanced Sensors and Systems for Brain and Breast Cancer Delineation</b> (Dr. Hardik Pandya)
Wednesday, 28 July 2021	<b>Human Values and Ethics</b> (Prof. B.P. Sahu)	<b>MEMS Impedance Flow Cytometry: A computation analysis for biological cell separation</b> (Dr. Kulwant Singh)	<b>How to implement MEMS technology for cost effective prototype development: A experimental case study on MEMS Pressure sensor</b> (Dr. Kulwant Singh)
Thursday, 29 July 2021	<b>Demo session using Intellisuite MEMS Software: Case Study-1</b> (Dr. Sripadaraja)	<b>Demo session using Intellisuite MEMS Software: Case Study-2</b> (Dr. Sripadaraja)	<b>Sensor interfacing with Embedded Systems</b> (Dr. P. Rangababu)
Friday, 30 July 2021	<b>Nanoscience &amp; Nanofabrication Technologies</b> (Dr. Nitin S. Kale)	<b>Microsensors for Chemical &amp; Biochemical Sensing applications</b> (Dr. Nitin S. Kale)	<b>Exam / Feedback Session &amp; Valediction</b>