

## President's Message

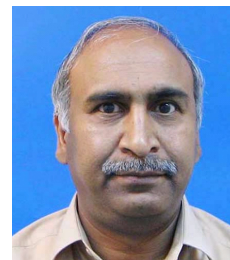
### Looking Back

The Institute of Smart Structures and Systems (ISSS) has come a long way since its inception in 1998. As a President for this elite society I would like to recall some of the events that happened for the last three years. ISSS organized its 6<sup>th</sup> International Conference at IISc during July 2010; a large number of participants from India made the conference a grand success. ISSS is working closely with National Programme on Micro and Smart Systems (NPMAS) in fostering the growth of Smart and Microsystems and its application across a large number of Institutions and research labs in India.

ISSS has initiated many programmes for the last three years to make the Society very vibrant and progressive. Here are some of the highlights.

1. ISSS Membership has crossed 500.
2. ISSS has Conducted 7<sup>th</sup> National Conference at Karpagam University, Coimbatore, in September, 2012.
  - a. Release of *The Journal of ISSS Journal*, a biannual technical journal; the second issue is already published and the third issue will be published shortly.
  - b. ISSS instituted *Young Scientist Award* for those

who are working in the area of Micro & Smart Systems. In addition, student paper awards given in PG/UG and research categories.



- c. ISSS-Coimbatore local chapter. This was inaugurated by Dr Aatre during September, 2012; has more than 70 members and the chapter is active in promoting ISSS activities in its region.

We have scheduled our next ISSS National Conference to take place in Pune on the 6<sup>th</sup> and 7<sup>th</sup> September, this year. I am also happy to inform the members that ISSS is planning to start a local chapter at Pune covering Maharashtra, Gujarat and Goa on 5<sup>th</sup>, Sept, 2013. The next big event planned is the 7<sup>th</sup> International Conference that will take place in July 2014. If I look back, we had maximum number of General Council meetings for the last two years with active support from Dr. V.K. Aatre. I would like to thank all the ISSS General Council members for excellent co-operation and active participation for the growth of ISSS. It is Dr. Aatre's dream to make this society spread across India in all the leading and upcoming institutions and research labs.



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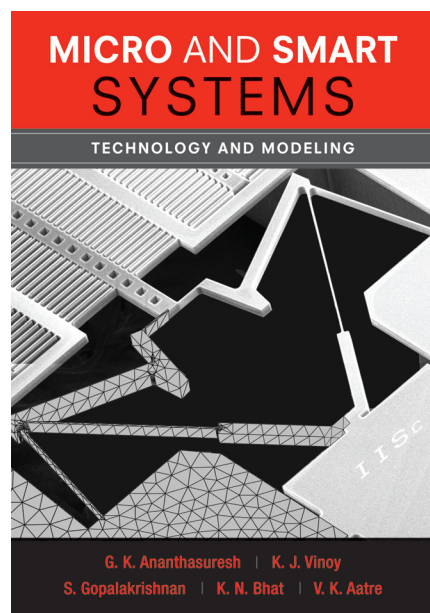
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## Micro and Smart systems

By G. K. Ananthasuresh, K. J. Vinoy, S. Gopalakrishnan, K. N. Bhat and V. K. Aatre



*Micro and Smart Systems* is a book dedicated for teaching fundamentals of Micro Electro Mechanical Systems (MEMS) and is authored by leading experts and well-known teachers in this field.

This book has been very lucidly written and can be understood and appreciated by science and engineering students at all levels, may it be first timers or beginners, technicians, engineers, scientists and professionals. The Authors' passion for the subject and the level of their involvement in the micro and smart systems field is evident from the flow of thought and the examples illustrated in the book. I am also aware of the fact that this book has emerged as a result of their continuous involvement in teaching this course to graduate level and undergraduate level students of different background and at various forums where each of them were able to capture the keen attention of students and teachers as well.

In my opinion, this is one of the very few books, which covers the following areas in complete detail:

Understanding about miniaturisation, microsystems, MEMS and its fabrication, smart materials-systems and its application related to sensors, actuators and structures.

A detailed overview of various MEMS based sensors, actuators, systems and smart materials including accelerometers, pressure sensors, gas sensors, fibre-optic sensors, comb-drives, micro relay, RF MEMS, blood analysis, inkjet printer head, micro

mirror array and PCR systems etc. illustrated in detailed way enlightening the reader with the help of many examples, material used, fabrication process adopted, their operation and the definitions of many terms. Thus the reader can understand the finer aspects and at the same time absorb many useful tips on these sensors and fabrication processes. In my view, by reading this book, an average student can develop and fabricate a sensor of his/her choice based on the above inputs.

The various MEMS fabrication technology with silicon, starting with cleaning, deposition, lithography, diffusion, ion implantation, etching etc. fascinates the reader to think on various research options available to him/her or to choose as a career in his/her field of interest.

The mechanics of slender solids in MEMS covers almost all aspects from simplest deformable element to dynamics of continuous elastic systems with all the applicable stresses.

The chapter on Finite element analysis is intimidating at the first sight, but on reading the material, it takes us to a different world of numerical methods, variational analyses and solution methods.

The modelling of coupled Microsystems is unique in that, it commences from fundamental electrostatics and gradually takes us to coupled electro-mechanics, its dynamics, squeeze-film effects, thermal aspects and elastic problems.

Further chapters related to electronic circuits and control for micro and smart systems deal with semiconductor devices, amplifiers, signal conditioning aspects and circuits, control systems and implementation of various controllers.

The chapter 8 on the integration of MEMS is a must for all those who are involved in MEMS of any sort. It gives us a basic idea of CMOS and MEMS, packaging aspects, special issues, reliability and failure mechanisms.

The real experience of authors on MEMS-based piezo resistive pressure transducer and accelerometer case study is the life-time achievement of these dedicated authors, who have sincerely discussed in detail the processes, the problems encountered

and the solutions thereafter, building confidence in the reader to design, develop, fabricate and package such device without much effort. This chapter is really appreciable since these details are not otherwise available elsewhere and will be an asset to all the readers.

The understanding and visualisation of any complex system becomes simpler on comparison with the objects that we know (in our day-to-day life) and assess the impact of their dimensions and size on their properties and performance capabilities. The chapter on scaling effects takes us to the interesting domain of mechanical, electro static, magnetic, thermal, diffusion, fluidics, optics, biochemical and its design and simulation. No other book, to the best of my knowledge, shares such information and the author's effort in making it simple and understandable is incredible and noteworthy.

The final chapter, Simulation Using FEA Software, gives the glimpses of force-deflection, accelerometer's natural frequency, micro actuators and electro thermal analyses, comb-drive, PZT accelerometer, RF MEMS switch, Capacitive pressure sensors simulation and analysis.

The special feature *Your Turn* is first of its kind, which I feel, one must see, read and experience.

This is definitely a must-for-all book containing the overview, modelling, technology, process, FE Techniques with principles of operation, materials and their properties, illustrations, examples, schematics, block diagrams, photographs, tables, applications, advantages, definitions, concepts, plots, equations, formulae, issues & challenges, summary, added exercises, references for further reading, all together is a boon to the undergraduate and post-graduate students, research scholars pursuing Ph.D degree and other research programs. This book will also be a great asset to the teachers who are involved in teaching micro and smart systems.

Review by:

**Dr. M.M.Nayak**

Former Director, LVPO, ISRO HQ Bangalore  
Former Deputy Director, Semiconductor Laboratory, Chandigarh  
Former Group Director, Advanced Transducer Development & Production Group, LPSC, ISRO Bangalore  
Presently Visiting Professor, Centre for Nano Science and Engineering, IISc, Bangalore

## *From the Editor's Desk*

I am indeed delighted at this opportunity to be the Editor of Sukshma! At the outset, I would like to thank the leadership of ISSS for providing me this opportunity. As you are already aware and experienced, Prof. Ananthasuresh, the outgoing Editor has sown, nurtured and grown Sukshma to great heights. It won't be ad nauseum to assert here that it is indeed an onerous task to succeed him and I will strive to sustain and further grow the commendable achievements of Sukshma under his leadership. Prof. Ananthasuresh and Prof. Vinoy have also established a working system to keep the machinery of churning out Sukshma running fairly smoothly. I am indebted to them for making the task of the new editorial committee that much more easy.

I would like to take this opportunity to also thank the members of the new editorial committee for having accepted our invitation and I eagerly look forward to working with them to enhance the relevance and impact of Sukshma. Let me share some of my thoughts in this direction. Like any successful newsletter of a professional body, Sukshma should continue to be an important medium to keep the members of our Society informed of all its activities. Furthermore, it should continue to provide a general awareness of pertinent activities in various academic, research and industrial organizations in our country. As you are aware, the broad area of smart materials, structures and systems is making rapid progress towards gaining increasing maturity and it becomes paramount necessity that Sukshma hold a beacon to these activities in our country. Also, timely feature articles on recent developments across the world with a perspective to gain a broad familiarity would go a long way in making Sukshma an eagerly awaited newsletter. Sukshma will continue to highlight several national programs run by agencies/bodies like NPMAS and INUP and provide regular updates on the progress of various projects funded by them.

Listing of publications by researchers in India in key journals would go a long way in creating awareness of recent progress as well as nature of activities in different academia, R&D organizations and industry. This would open up and foster possible collaboration between different expertise groups and will go a long way in promoting high quality research and product development. In this direction, it would also be highly beneficial for the community to have Sukshma highlight the technical facilities in different national centers that could be availed. Another important feature would be the reviews of books authored by our colleagues in the topic of smart and microsystems. Of course, it would be more than welcome if we could have some nice cartoons that can bring out the various facets of smart technology and microsystems with some fun and pun!

I request each one of our members and readers of Sukshma to contribute to the continued success of Sukshma. Needless to say, you are the true patrons of Sukshma.

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### **Invitation for Sponsorship**

Sponsorships are sought in the following categories:

#### **Platinum Sponsor: (Rs. 5 Lakhs):**

10 complimentary registrations. One exhibition stall measuring 3mx3m (approx), mention in all publications and major displays at the venue; and two pages in the conference souvenir. In addition, one of the following options may be chosen: Conference Dinner (Permanent display of sponsors' banners at all food venues) OR all days' lunches (display sponsors' banners at the lunch venue) OR Conference kit OR an additional exhibition stall period.

**Gold Sponsor: (Rs. 2 Lakhs)** 5 complimentary registrations. One

exhibition stall measuring approximately 3mx3m, mention in all publications and major displays at the venue, and a page in the souvenir; Options: Any one day lunch (display sponsors' banners at the corresponding lunch venue) OR additional exhibition stall OR a page in souvenir period.

**Silver Sponsor: (Rs. 1 Lakh)** 2 complimentary registrations. One exhibition stall measuring approximately 3mx2m, Mention in all publications and major displays at the venue; Options: additional exhibition stall OR a page in souvenir.

### **Registration**

The details regarding registrations are available on the website given the below. All authors who are presenting

papers are expected to register for the technical sessions. This does not include special fees for the pre-conference workshop being held on July 15<sup>th</sup>.

Delegates outside India should make payments through International Bank Draft payable at par at Bangalore. Any bank commission or other charges should be included in the amount of the draft in addition to the Registration Fee. Delegates from India should make payments through crossed bank draft or pay-order or cheque or online transfer payable at par at a bank in Bangalore.

For Details visit <http://www.isssonline.in/iss-2014>

Contact information: Organizers: [admin@isssonline.in](mailto:admin@isssonline.in), General Enquiries: [iss-2014@gmail.com](mailto:iss-2014@gmail.com)

Technical Programme Committee: [tpcchair@isssonline.in](mailto:tpcchair@isssonline.in)

Proposals for Short-courses/Tutorial-workshops and Financial Sponsorships are welcome



# Institute of Smart Structures & Systems (ISSS)

## Seventh ISSS International Conference on Smart Materials Structures & Systems ISSS 2014

### Indian Institute of Science, Bangalore

July 15-18, 2014

**Organized by Institute of Smart Structures & Systems and Indian Institute of Science**  
**Co-organizers: Central Machine Tools Institute and MS Ramaiah Institute of Technology**

ISSS is organizing its 7<sup>th</sup> triennial International Conference, providing the platform for dissemination of knowledge and information amongst the practitioners of Smart and Micro systems technology. The present conference is jointly organized by ISSS and Indian Institute of Science (IISc). Central Machine Tools Institute (CMTI) and MS Ramaiah Institute of Technology (MSRIT) are the co-organizers of this event, to be held at the National Science Seminar Complex, IISc Bangalore.

#### Important Dates

Manuscript submissions open:  
**September 7, 2013**  
Manuscript submissions close:  
**February 15, 2014**  
Intimation of Paper Acceptance:  
**April 15, 2014**  
Early-bird registration deadline:  
**May 15, 2014**  
Last date for camera ready  
manuscripts for  
e-proceedings: **May 15, 2014**  
Pre-conference Tutorials: **July 15,  
2014**  
Technical Sessions of ISSS-2014  
**July 16-18, 2014.**

#### Structure of the Conference

The conference will have several Plenary and Invited talks on contemporary areas. In addition, contributions are sought for oral (three parallel tracks) and poster sessions of the conference on topics including (but not limited to):

- Adaptive/smart materials
- Sensors and Actuators
- Design, modeling and simulation
- MEMS: Design, electronics and packaging
- Nanotechnologies

- Micro and Smart Systems for Energy Harvesting
- Signal conditioning & processing techniques and cyber physical systems for microsystems
- Applications: Structural Health Monitoring, Automotive sensors, Agriculture, BioMEMS and RF-MEMS

Pre-conference workshops on emerging topics are planned on July 15, 2014 on topics related to Energy Harvesting Systems and Various applications of micro and smart systems. In addition, an interactive session / panel discussion with various industry experts is planned during the Conference. Special sessions for

- presentation of ISSS annual award/felicitation
- interaction with Industries and to highlight the achievements of the National Programme on Micro And Smart Structures (NPMASS) will be organized on the sidelines of the Conference.

#### Instructions for Authors

Prospective authors are requested to submit contributions online via the portal *edas* [[edas.info](http://edas.info)] as a *pdf* file on or before **February 15, 2014**. The submitted article should be in the near-final, camera ready form, written clearly and concisely, and should highlight important technical contributions and crucial results which will enable a decision on the acceptance. Hardcopy/email submissions will not be considered. If the manuscript is accepted for the conference, authors should agree to transfer their copyright to ISSS.

All submitted manuscripts may

contain completed research/development activity with expected validations. The manuscript should be limited to four pages in a two-column format. Embed all figures, tables etc. within the body of the manuscript. Please use MS Word template available online at our website for preparing the final manuscript. The acceptance will be based on the review of the manuscript and the decision of the review will be communicated to the corresponding author by **April 15, 2014**.

Subsequent to acceptance of the manuscript, final manuscript in pdf format after incorporating all suggestions of the reviewers and the technical program committee of the conference, and embedding all figures, graphics etc should be submitted again through *edas*. The final camera-ready manuscript of final papers should be submitted by **May 15, 2014**. A signed copyright form is also required at this stage. At least one of the authors should be registered for participation by the advanced registration deadline, for the inclusion of the paper in the Proceedings.

An e-proceedings of the conference containing all accepted full-length papers are planned to be made available to the registrants of the Conference. All these articles will be doi indexed and be made available at the conference website.

A few of the contributed papers presented during the conference will be short-listed for publication in the recently launched **Journal of the Institute of Smart Structures & Systems** after further review.

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