

**FOURTH INTERNATIONAL WORKSHOP ON  
THE ROLE OF DEVELOPING COUNTRIES  
IN VLSI AND MICRO-SYSTEMS TECHNOLOGY  
Cairo (Egypt), December 24-26, 2003**

*PARTICIPATING COUNTRIES: 10 (INCLUDING 7 MEMBER COUNTRIES AND 1 S&T INDUSTRY  
NETWORK MEMBER OF THE NAM S&T CENTRE)*

*NUMBER OF PARTICIPANTS: 12*

The high level of technological sophistication achieved by our civilization is based on the progress made in the fields of microelectronics and information technology. Last few decades have seen a sea change in the realm of microelectronics. Successive generations of miniaturization of electronic systems have resulted not only in the improvement of their performance but also in the economics of scale. Microelectronics encompasses areas as diverse as communication, information technology, data processing and process control to automation of a range of industries as well as biological and medical applications. Sensors based on micro-electromechanical systems (MEMS) have been dominating the microelectronics scenario since many years and are markedly becoming relevant in our day-to-day lives. Recent developments in the field of MEMS based micro-sensors using physical, chemical and biological sensing elements have shown great promise for the realization of smart sensors and their numerous applications. Compatibility of signal conditioning and processing circuitry fabrication technology with MEMS-based micro-sensors has enhanced the process of integration. However, the design of appropriate modules and interfaces has been a challenging task in the present scenario.

Recent awareness of micro-systems has led to opening up of newer areas of application, which were earlier considered outside the realm of microelectronics. The advancements in microelectronics fabrication technology have resulted in the development and fabrication of an assortment of high quality and high precision micro-sensors. Further, low production costs due to the application of batch fabrication technology, small size and low power consumption have facilitated the transformation of the manufacturing of microelectronics and micro-systems into a commercially viable industry. Since the developing countries are gradually entering microelectronics R&D and production and because of its immense commercial potential, their requirement in being aware of the capabilities, limitations, economics and infra-structural necessities of microelectronics production has now multifold increased in order to decide upon and plan an appropriate microelectronics related programme in their countries.

In view of the ever-growing importance of Microelectronics affecting our daily lives, the Governing Council of the NAM S&T Centre has accorded high priority to this area. Accordingly the 1<sup>st</sup> International Workshop on 'Developments in Microelectronics' was organised by the Centre during August 21-24, 2000 at the School of Advanced Technology, Asian Institute of Technology (AIT), Bangkok, Thailand, which covered digital and analogue electronics design with a laboratory session encompassing circuit design, device fabrication including processing technology and VLSI system design with a laboratory session comprising design, simulation and integration. This workshop was

followed by a policy level 2<sup>nd</sup> International Workshop on 'Trends in Microelectronics R&D and Industry', organised by the NAM S&T Centre at Da Nang, Vietnam during November 20-23, 2001 to provide an opportunity for policy makers from member countries to familiarise themselves with the latest trends in microelectronics R&D and also in microelectronics industry to help them in formulation of their national policy. Subsequently, during December 4-6, 2002 the 3<sup>rd</sup> International Workshop on 'Development of Microelectronics' was organised in New Delhi, India in association with the Central Electronics Engineering Research Institute (CEERI), Pilani, India and the School of Advanced Technology of the Asian Institute of Technology (AIT), Thailand with the theme as 'The Role of VLSI in MEMS', which was aimed at reviewing the status of microelectronics in the world, familiarise participants with the latest trends in the technology of microelectronics, particularly related to VLSI in MEMS, nano-technology and current industry focus.

The 4<sup>th</sup> International Workshop on Microelectronics with the theme as the 'Role of Developing Countries in VLSI and Micro-Systems Technology' was organized by the NAM S&T Centre at Cairo, Egypt during Dec. 24-26, 2003 jointly with the Academy of Scientific Research and Technology of Egypt and Electronics Research Institute, Cairo to help identify the new challenges being faced by scientists and technologists in further development of microelectronics and micro-systems, difficulties in transfer of technology and know how and the current trends and policies in the field of microelectronics.

Several scientists from eleven developing countries, respectively, Bangladesh, Bosnia and Herzegovina, Egypt, India, Indonesia, Jordan, Myanmar, Sri Lanka, Sudan, Tanzania and Turkey shared their knowledge with each other in the above event. While Turkey is a member of the Centre's S&T-Industry Network, the other countries shown in italics are not the members of the NAM S&T Centre. The participating specialists and experts included, besides Engr. Mrs. Ghada Hamdy of the Electronics Research Institute (ERI), Cairo and several other scientists from Egypt, Engr. Md. Dulal Hossain from the Ministry of Science and Information & Communication Technology, Dhaka, Bangladesh; Dr. Zijo Pasic, Head of Automatic Control & Electronics Department in the University of Sarajevo, Bosnia and Herzegovina; Dr. S.P. Uttam, Sr. Director, Department of Information Technology, Ministry of Information Technology & Communication, Government of India; Dr. Totok M.S. Soegandi, Head of Research Centre for Electrical Power and Electronics in the Indonesian Institute of Sciences, Jakarta, Indonesia; Prof. Ir. Djoko Hartanto, Chairman of Academic Senate, Faculty of Engineering in the University of Indonesia, Depok, Indonesia; Mr. Hisham Shaban, Electronics Design Engineer at the Electronics Services and Training Centre, Jordan; Dr. (Ms) Khin Htike Htike Lwin from the Department of Technical and Vocational Education, Yangon Technological University, Myanmar; Dr. Satish Sudalaimuthu Namasivayam, CEO/Director, Arthur C. Clarke Institute for Modern Technologies, Moratuwa, Sri Lanka; Engr. Baragg M. Yahia, Manager, IT Department in the Ministry of Science and Technology, Khartoum, Sudan; Dr. Damian D. Haule of the University of Dar es Salaam, Tanzania; and Dr. Tayfun Akýn from the Department of Electrical & Electronics Engineering in the Middle East Technical University, Ankara, Turkey.

The resource speakers in the workshop comprised four eminent scholars, respectively, Prof. Magdy A. Bayoumi, Director CACS in the University of Louisiana, Lafayette, U.S.A.; Prof. Mohammed Ismail, Ohio State University, U.S.A.; Dr. Shamim Ahmad, Ex-Director, Central Electronics Engineering Research Institute (CEERI), Pilani, India; and Dr. Hamid Elsimary, Acting Head, Microelectronics Department, Electronics Research Institute, Cairo, Egypt.

The Workshop was divided into six sessions over a period of two days. It was inaugurated by Prof. Mohsin El-hagry, Vice-President, Electronics Research Institute, Cairo; Dr. Hamid Elsimary, Electronics Research Institute, Cairo; Dr. Arun P. Kulshreshtha, Director, NAM S&T Centre; and Ms. Iman Koushkoush from the Academy of Scientific Research and Technology, Egypt. The keynote address by Prof. M. Bayoumi of the University of Louisiana in USA was on 'Wire or Wireless'. In his very interesting talk he mentioned that the current driving force for semiconductor industry is wireless communication i.e. cell phone and about 1.5 billion cell phone subscribers are expected by 2010 or even before. He presented the challenges being faced with respect to power dissipation, communication bandwidth, signal integrity, SOC (with regard to have different technologies on the same chip) etc. and also explained the VLSI design challenges at 45nm technology with 4 billion transistors running at 10GHz on a single chip. In the other keynote address Prof. Mohammed Ismail from the Ohio State University, USA spoke on 'Radio for 3G & 4G Wireless'. He presented the features and broad issues of radios for wireless e.g. IP issues (SIP protocol, VoIP, VoWLAN etc.), migration, backward compatibility & future, and convergence issues (always & best connected). He also described the evolution of handset specifications for CDMA, GSM, Blue tooth, GPS etc. and technologies for VLSI chips and stressed that for handset design, co-design of chip package and chipboard has become very important. Dr. S. Ahmad, Former Director of the Central Electronics Engineering Research Institute (CEERI), Pilani, India in his address informed the participants of the research work being carried out on the development of capacitive type MEMS based micro-sensors in his organization under the Indian National Programme for Smart Materials. Theoretically, capacitive types MEMS-based micro-sensors show enhanced sensitivity and are less temperature dependent than piezo-resistive pressure sensors. Dr. Ahmad also shared the experimental results and technological skills generated in the past five years with the participants. Dr. Hamid Elsimary from ERI, Cairo in his talk covered, besides others, design of a hearing aid circuit and MEMS microphone.

The participants from various developing countries presented the status of electronic / microelectronic industry, existing infrastructure for R&D and fabrication of VLSI based MEMS systems and the difficulties faced in developing world class research and fabrication facilities in their countries.