IEEE
Design Automation Technical Committee

IEEE DATC Newsletter

Q3 2007 **Volume 1, Number 3**

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Message from the Chair

As the fourth quarter of 2007 ensues, we are glad to report that DATC has dramatically increased its level of activity and visibility this year. Our online newsletter was well received and we are already getting more contributions than we can deal with on a single quarter. Our online newsletter showcases pioneering DATC initiatives, such as (a) providing unique summaries of conferences beyond the well-established western markets, from places such as Eastern Europe, that DATC is helping bring into the IEEE family, (b) providing first view into opinion articles before they appear in other venues, in topics that are emerging and / or straddle the technology-market border, such as system-level design or the impact of globalization of systems and chip design; and (c) summarizing our own series of meetings and tutorials in emerging topics not well covered in other venues.

On the first topic, emerging market conferences are growing much faster than the conventional venues, and DATC is establishing collaborations with them early on to help bring them into the IEEE family, following IEEE guidelines. On the second topic, emerging topics such as "the new global engineer" are covered by top experts such as our Editorial Chair Gary Smith. Finally, on the third topic, we are glad to report that we celebrated our annual meeting and first "Design for Globalization" tutorial at the IEEE/ACM International Conference of Computer-Aided Design (ICCAD) on November 8, in San Jose (see iccad.com website for information on this event). The 3-hour event covered key topics in globalization and system level design, plus actual demonstration of virtual, remote system design tools by leading institutions. Such event was lead by our New Initiatives Chair Andrzej Rucinski and hosted by Ted Kochanski from the University of New Hampshire.

Our collaboration with our Society and Council is going strong, including helping our CEDA Council with a new certification program in chip design with initial focus on China, clearly another emerging geography. Finally our web site keeps improving in leaps and bound, and the person to truly thank there is our Online Chair Joe Damora.

Please see more details below in our online newsletter. We look forward to a 2008 year full of even more growth and excitement.

Preview of New Conference: IT 2008

A new conference, the 1st International IEEE Conference on Information Technology IT'2008 will be held in Gdansk University of Technology, Gdansk, Poland, from May 18 to May 21 of 2008. See conference Web Site at www.ti.eti.pg.gda.pl.

The objective of the 1st International IEEE Conference on Information Technology is to create a platform for integration of academic research institutes and industry enterprises. We hope that the Conference will become

an open forum for presenting the latest developments in Information Technology itself and its various applications and for providing encouragement for projects in which both research and commercial enterprises will take part, boosting entrepreneurship and innovation in leading and emerging areas of IT. Information Technology is currently the driving force behind the advance of information societies and knowledge-based economies. New scientific disciplines and new professions appear, new areas of industry develop, and interdisciplinary scientific projects are undertaken. The European Union, which Poland joined three years ago, provides abundant financial support for the development of information technologies including special research programs.

The conference will be held at the Gdansk University of Technology, the largest technical university in Northern Poland, which is widely recognize internationally, in the new building of the Faculty of Electronics, Telecommunication and Informatics, which is first fully-intelligent building at the University.

Conference thematic sessions (will be updated) include Electronic Documents and Digital Libraries, Methodologies for Developing IT Products, Sensor Networks, Geoinformatics, Embedded Systems and Systems on a Chip, Artificial Intelligence, Dependability and Security, Bioinformatics, Mobile Internet, Wireless Systems and Networks, Knowledge Engineering and Management, High Performance Computing, and Multicore Systems. Proposed list of Invited Speakers includes Prof. Jerzy Buzek, from the European Parliament, Mr. Henry Cooper, US Ambassador in Poland, and many other leading figures.

Article: A New Breed of Engineer

By *Gary Smith*

On and off, during the years, there have been some complaints on the quality of education for the new EE graduates. My experience over the past 30 odd years has been generally positive, with the exception of universities dropping the circuit design courses as a requirement during the mid 1990s. Recently Ed Lee from UC Berkeley, and some other professors have been talking about a new, and I believe extremely important engineering curriculum for embedded designers. Actually what we are seeing is the need for an engineering curriculum for an entirely new breed of engineer.

Daya Nadamuni and I stumbled across this new engineer in 2002, when Daya found a strange result from her yearly Embedded Survey. One of the questions was meant to track the movement from assembly language to C for the embedded engineering community. In 2002 the trend seemed to be moving from C to assembly language, completely backward from what we had been seeing in previous years. As we do when we see an anomaly, we got on the phone and started calling the embedded engineers that had switched back to assembly language. On my fifth phone call I got the answer that has changed the direction of much of my research every since. During the first four calls I got the expected answers of more control over the code, faster execution, etc. But the fifth engineer simply said that it was faster to code in assembly than to code in C. After some digging I discovered that what he was saying was that jury-rigging C, a sequential language, to do a concurrent job was more time consuming than writing assembly code. This was my introduction to the parallel programming problem.

A couple of years later we found that these programmers had started calling themselves software engineers. Actually it wasn't just the embedded engineers that were struggling with the multi-core SoC challenge; it was also the software architects that were struggling with the shift from Von Neumann

computing to the world of parallel computing. They all were doing their best to separate themselves from the world of sequential programming.

I'll have to admit that this concurrent software challenge has caught us by surprise. The good news is that the research community has shifted into high gear and we are rapidly making progress in developing the new concurrent software infrastructure. Still we have a long way to go. The ITRS Design TWIG has predicted that we must have at least the rudimentary concurrent tools, and possibly a new language, ready by 2013 or the cost of design will have a significant impact on the continuation of Moore's Law; which brings us back to the new curriculum. The students that are just entering the universities are the engineers that will be graduating in 2013. I highly recommend that the development of the new curriculum be placed in high gear. We urgently need to educate this new breed of engineer for the concurrent software requirements we are seeing today.

Article: IEEE and Design of Microelectronic Systems for the Global Era

By *Andrzej Rucinski*

The year's recently Microelectronic Systems Education Conference 2007 has reinforced the importance of the IEEE as the global counterbalance to the centrifugal forces of globalization on the Microsystems Engineering community. The MSE'07 showed that Microelectronic Systems engineering has become more of a true systems engineering discipline with true nearly stand-alone systems integrated into a chip or into a package and incorporating a diverse collection of technologies from traditional CMOS digital to RF, high performance analog, MEMS sensors and actuators, nano devices and even optical and quantum elements. This observation was also made in a report on the "Future Directions in Design Automation Research: Report from a Forum held at the National Science Foundation, October 30-31, 2006," which stated, "…Designers will be required to think in terms of system-level requirements and, for example, will need to co-design software and hardware simultaneously…But this is just the beginning of the design challenge since it is very likely that some applications will require the design of chips that respond to chemical, thermal, mechanical and other inputs as part of their sense, evaluate, and report function, often using only nanowatts of power…"

Only the IEEE has membership in every part of the world in both industry and academia and has an established global network of local communities of interest through its Sections and local chapters of the Technical Societies. However, as currently constituted, the existing IEEE functions and elements may be inadequate to meet all of the requirements of the new global microelectronics industry and microelectronics systems engineering profession in the Global Era. Therefore the attendees informally discussed the expanded role for the IEEE in several key areas: As Maintainer of Standards; As Disseminator of Best Practices from industry; As Guardian and Repository of Knowledge.

Specifically, the role of IEEE needs to extend well beyond its traditional role as the source of global technical standards such as JTAG and 8.02.xxx, to encompass an expanded role as the global guarantor of quality in education curricula, mediating between the ABET and Bologna curriculum and program accreditation processes. In parallel, the IEEE can help insure professional integrity by combating a disturbing trend for increasing plagiarism at the university level and widespread unauthorized copying and dissemination at all levels.

In the area of disseminator of knowledge the IEEE has an established and extremely well respected system based on peer-reviewed papers that are contributed to conferences and submitted for publication in the IEEE Technical Journals {e.g. “Philadelphia List” publications}. The attendees identified an increased role for the IEEE to collect, codify and disseminate not just research, but the state-of-the-art best practices of industry in microelectronics systems design. While some of this is already occurring through the local Sections {e.g. Boston Section’s long established “Lecture Series” on Radar}, Technical Societies {e.g. Aerospace and Electronics Systems Society is developing a series of low-cost web-based video lectures} and on-line through traditional IEEE and corporate “webinars,” there is no central IEEE-based repository for the global microelectronics systems best practices to be collected and disseminated in formal Technical Currency courses that are accessible to the practicing engineer as well as a supplement to the in-class lectures in small university engineering departments.

Finally, there is the matter of the repository as recommended by the NSF Report, “…there is a need for an open-access, open-source integrated university design environment with libraries that can continuously be improved by the university community.” Since the MSE’07, the concept has begun to be implemented: a Steering Committee for the IEEE Global Education for Microelectronics Systems Initiative {I-GEMS} has been constituted under the aegis of the Design Automation Technical Committee. The Steering Committee for I-GEMS is chaired by Prof. Rucinski with members: Don Bouldin {U. Tennessee, and MOSIS}; Jim Aylor {U. Virginia and Computer Society}; Juan-Antonio Carballo {DATC Chair}; Thaddeus Kochanski {IEEE Boston Section and UNH}; I-GEMS has received encouragement from the IEEE Boston and New Hampshire Sections. Several industrial partners have expressed support for the concept and I-GEMS is planning a demonstration of the concept of web-based distributed model-based design at the ICCAD Tutorial in November and expects to host in the summer of 2008 a “Design for Globalization” Interest Workshop.

Contribution Opportunities

The IEEE DATC welcomes proposals for contributions to this newsletter. Contributions should shed light on non-obvious key EDA trends. Educational contributions in emerging areas such as ESL and DFM are especially welcome. The ideal length of a contribution is a half a page in the form of a short fact-based essay with data or references backing the stated position, but longer contributions may be considered. Publication of important graphics and data tables might be possible by request. Please send proposals in the form of a 2-paragragh abstract to the editors at jantonio@ieee.org.