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President's Column.....



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Greetings!!!

What's in your Holiday Gift Wish List?

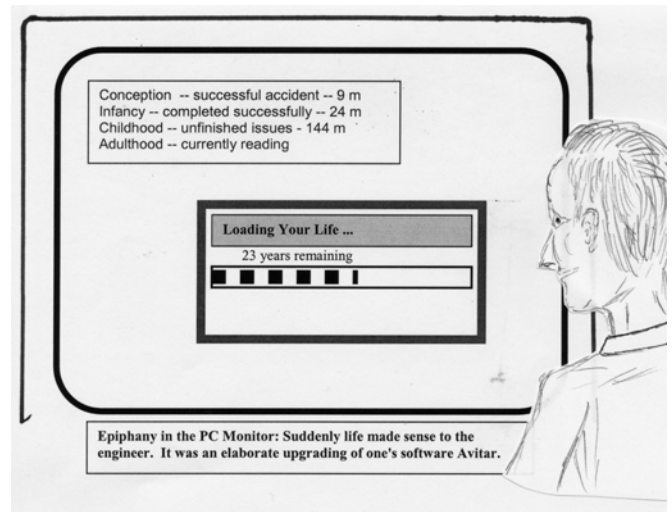
The month of December has become a very important month for the electronics industry. For consumers this has been the month of gift lists, gift shopping and gift giving. The daily news reports indicate that electronic products are at the top on consumers' buying lists. Such include HD televisions, digital cameras, game consoles, cell phones, MP3 players, iPods, laptop computers, and many peripheral products derivatives that an individual person would carry with him or her, for leisure and business, at home, at the office, or at sporting activities.

People of all ages are adopting new technologies, nested in new electronic products, at an astonishingly fast rate. They range from multifunction music players, digital cameras, camcorders, health monitoring devices, and life-like HD home entertainment centers, interconnected to the internet and wireless services. New players are coming into the consumer electronics market space with new offerings that spark the imagination, whether it is to be music, video or news on-the-go, or instant access to family, friends, and businesses, around the globe. Interactive games and more life-like home entertainment are being offered with great fanfare and excitement.

From the early days of Jack Kilby and Robert Noyce, the electronics industry has always been driven by the market and pushed by technology. This market drive has been led by faster system performance from mainframe computer servers to workstations, and PC's with decreasing cost, over the last forty years. For these forty years this market drive has been well served by the technology push under the banner of Moore's Law, which called for doubling of transistors per device every 12 to 18 months.

Today's consumer driven market adds different dynamics to this market drive and technology push equation. While Moore's Law is necessary, the industry needs "more than Moore" innovations to meet the challenge of the market drivers. (Continued on Page 3)

Cartoon of the Month:



... By Dave Palmer

IEEE CPMT Society Board of Governors Members-at-Large for 2007-2009

Dr. Philip E. Garrou, Chair Nomination Committee, and Ms. Marsha Tickman, Executive Director, CPMT Society

The IEEE Components, Packaging, and Manufacturing Technology Society Constitution and Bylaws provide that the membership shall elect each year six Members-at-Large to the Society Board of Governors to serve a three-year term.

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President's Column (Continued from Page 1)

"More Moore" and "More than Moore"

In 1965 Gordon Moore, then Director of Research at a small start-up company called Intel, wrote a technical paper projecting that in the next decade the number of transistors in an integrated circuit device would double every 12 to 18 months. This has become known today as the Moore's Law. It is the guideline for the semiconductor industry in the timing for industry-wide technology for advanced IC products. With decreasing feature size, packing more transistors in the same space results in increasing performance (speed) and effectively lower cost per transistor. Moore's Law scaling is the standard-bearer that drives the semiconductor industry's supply chain from the front end to the back end. It focuses the knowledge supply chain – from research to development and manufacturing – to come up with scientific advances and technology breakthroughs. The International Technology Roadmap for Semiconductor (ITRS) has closely monitored the global industry and charted the future technology directions and timing based upon Moore's Law.

Periodically there have been serious discussions on whether Moore's law scaling will reach an end, because of limits of physical law. The industry has continued producing higher density faster chips at decreasing technology nodes. These, in turn, enable more powerful and faster computers, routers, workstations, PCs and laptops.

Today HD TVs, cell phones, digital cameras, PDA's (Blackberries), iPods, MPC players, game consoles and other consumer gadgets incorporate capabilities and functions, more than just raw IC computing speed. These functions are provided by RF & mixed signal devices, different sensors, MEMs, image sensors, and other analog devices. The requirements for miniaturization, size, weight, shape and look to appeal to the ultimate consumer add further sophisticated dimensions to the directions of device packaging and system integration.

At the ITRS Spring Conference in April 2006, the phrases "More Moore" and "More than Moore" were been added to the roadmap lexicon to formalize this duality of technology directions. In past years we have seen an acceleration of innovations in device and system packaging. Packaging architecture and design concepts, system integration technologies, packaging materials, and manufacturing processes are all progressing rapidly. The cell phone and broader consumer electronics products market have led the way in adoption of new technologies such as wireless and mixed signal devices, image sensors and optoelectronics, MEMs and biochips. These technologies and the market in turn drive new innovations including system in package (SiP), wafer level packaging, three dimensional packaging, thinned wafers, printable circuits, embedded passives and active devices. And the list goes on.

Innovations and Creativity

In my personal view this rise of consumer-related electronics products is very much related to how individuals work and to the growing global networked environment. I have included here cell phone, PDA, laptop, GPS, game consoles, iPods, digital cameras, video recorders and players, and

other devices and accessories that expand our reach over the internet and wireless network. While the convergence between communication and computing has been long forecasted, we now are seeing their benefits to individuals and their impact in the consumer electronics market.

It is interesting that one of the leading game consoles available on the marketplace today contains some of the most advanced device and packaging technologies and sells for several hundred dollars. And its operation takes full advantage of the broadband communication channel in the global internet network. (see December 2006 issue of Spectrum). At the same time another one of the most popular game consoles has, in its controller function, a state of the art three axis accelerometer MEMs device, connecting the players to the game. This is the same MEMS device technology used to control automobile stability. Think about it. We have literally the best creative innovations and most advanced technologies in the palms of our hands.

What will come next? And what was on your Holiday Gift List?

Food for Thought

In my last September message to you I talked about the multidisciplinary nature of our profession. I was reminded of this recently when I read a column by Thomas Friedman in the International Herald Tribune. He quoted Marc Tucker, head of the National Center on Education and the Economy, whose organization would be coming out with a report on the US educational system titled "Tough Choices or Tough Times". This quote from Marc Tucker reads: "One thing that we know about creativity is that it typically occurs when people who have mastered two or more quite different fields use the framework in one to think afresh about the other." Our profession, which is full of people from diverse disciplines, emphasizes creativity, invention and innovation in everything we do. Together let us make CPMT the "Creativity and Innovation Society".

IEEE CPMT Society Board of Governors Members-at-Large for 2007-2009

(Continued from Page 1)

The IEEE Components, Packaging, and Manufacturing Technology Society Constitution and Bylaws provide that the membership shall elect each year six Members-at-Large to the Society Board of Governors to serve a three-year term.

In 2004, the CPMT Board of Governors approved revisions to the Constitution and Bylaws to ensure that the Board reflects and represents the Society's global membership. This is the second election to be conducted under the new methodology – in which members-at-large will be elected to achieve totals proportionate to the geographic distribution of CPMT members. For the 2006 election, this translated as follows:

*Regions 1-6, 7 and 9 (US, Canada, South and Central America):
Elect 3 members*

*Region 8 (Europe, Africa, Middle East): Elect 1 member
Region 10 (Asia/Pacific): elect 2 members*

The six Members-at-Large elected will join continuing Members-at-Large on the Board of Governors:

From Regions 1-6, 7 and 9: Vasudeva Atluri, Steve J. Bezuk, Rajen Chanchani, Li Li, Kitty Pearsall, Dongkai Shangguan, Pat-

rick Thompson and CP Wong. *From Region 8:* Eric O. Beyne, Klaus-Jürgen Wolter. *From Region 10:* Kishio Yokouchi.

The Nominating Committee included the CPMT Strategic Program Director, Region 8 Johan Liu and the Strategic Program Director, Region 10 Charles Lee. Each Strategic Program Director worked with volunteer leaders in his respective Region to identify a high-quality slate of candidates from that Region.

Voting members elected Members-at-Large from within their respective Region only -- that is, members in Region 8 voted for Members-at-Large from Region 8 only; members in Region 10 voted for Members-at-Large from Region 10 only, etc.

The following pages contain biographies and photographs of candidates elected for CPMT Society Board of Governors Members-at-Large for 2007 from all Regions.

Regions 1-6, 7, 9:



PAUL D. FRANZON (S'85, M'88, SM'99, F '06) is currently a Professor of Electrical and Computer Engineering at North Carolina State University. He earned his Ph.D. from the University of Adelaide, Adelaide, Australia in 1988. Prior to earning his

Ph.D., he worked for DSTO Australia, designing towed array sonars, and was a consultant at AT&T Bell Laboratories, working on Wafer Scale Integration. In Australia, he also cofounded Communica Pty.Ltd. which focused on computer networks.

Since 1989, he has primarily worked at North Carolina State University. His focus there has been on building systems incorporating advanced packaging, high frequency CMOS VLSI, MEMs and Nanotechnology. His group has built a number of systems including high performance cryptographic and DSP MCMs, 3D DSP and computer systems, as well as hardware for advanced networking. His group has worked on a number of novel high-speed interconnect schemes, both intra and inter chip. He also has a strong interest in integrated Microsystems and Nanocomputing. He is well known as an expert in the design and signal integrity analysis of high speed electronic systems, chips and packaging. In 2000, he cofounded LightSpin Technologies Inc., where he also worked as VP (Engineering). Since 1989, He has secured over \$20M of research funding, has graduated over 22 Ph.D. students, has been awarded four patents, and has published over 150 papers.

Dr. Franzon also served for 13 years as an Infantry soldier and officer in the Reserve Component of the Australian Army, including 3 years of attachment to the US Army National Guard. He held ranks from Private to Captain.

Inside CPMT, Dr. Franzon has served for several years as an Associate Editor for the *IEEE Transactions on Advanced Packaging*. He was Program Chair and General Chair of the IEEE Multi-Chip Module Conference in 1996 and 1997. He is co-chair of the IEEE Topical Workshop on Electrical Design of Electronic Packaging, in 2006-7.

In 1993 he received an NSF Young Investigators Award; in 2001 was selected to join the NCSU Academy of Outstanding Teachers; in 2003, selected as a Distinguished Alumni Professor and in 2005 won the Alcoa Research award. Dr. Franzon is a Fellow of the IEEE. His citation is "for contributions in chip-package codesign".

As a member of the Board of Governors, Dr. Franzon would like to focus on developing programs that enable engineers to maintain their technical edge and relevance through their entire careers.



WAYNE JOHNSON (S'77, M'79, S'80, M'82, S'85, M'87, SM'94, F'04) is a Professor of Electrical and Computer Engineering at Auburn University and Director of the Laboratory for Electronics Assembly and Packaging (LEAP). During his 19 years at Auburn, he has

established teaching and research laboratories for advanced packaging and electronics assembly. Research efforts are focused on materials, processing, and reliability for electronics assembly and for extreme environment electronics. Current research projects span the temperature range for -180°C to +485°C. He has published and presented numerous papers at workshops and conferences and in technical journals. He has also co-edited one IEEE book on MCM technology and written book chapters in the areas of silicon MCM technology, MCM assembly, automotive MCMs (IEEE Press), flip chip assembly and high temperature packaging (IEEE Press). He is the Editor-in-Chief of the *IEEE Transactions on Electronics Packaging Manufacturing* and served as an Associate Editor prior to this appointment. He was elected a Fellow of IEEE in 2004 for "his contributions to electronics that must operate in harsh environments."

Dr. Johnson received the B.E. and M.Sc. degrees in 1979 and 1982 from Vanderbilt University, Nashville, TN, and the Ph.D. degree in 1987 from Auburn University, Auburn, AL, all in electrical engineering.

Wayne is also a member of the International Microelectronics and Packaging Society (IMAPS), the Surface Mount Technology Association (SMTA) and IPC. He was the Technical Vice President of IMAPS from 2000-2004.



LEONARD W. SCHAPER (S'65, M'67, M'92, SM'96, F'99) received his B.S.E.E. from Newark College of Engineering in 1967, his S.M.E.E. from MIT in 1968, and his Doctorate from New Jersey Institute of Technology in 1973. He taught at NJIT before joining AT&T

Bell Laboratories in 1978. There he held positions in electronic power conversion, electronic technology planning, and technical management. In 1990 he joined Alcoa Electronic Packaging, leading their thin-film MCM work. In 1992 he became Director of the High Density Electronics Center and Professor of Electrical Engineering at the University of Arkansas, where he led a research program in advanced interconnect technologies, including superconducting MCMs, diamond heat spreaders, mesh plane power distribution, MCM-D/L process development, integral passives, flex/thin silicon packaging, and ultra-low inductance decoupling capacitors. In 2002 he gave up administrative responsibilities at HiDEC to concentrate on teaching and research.

Len has been active in electronic packaging since 1980. He holds eighteen patents and has authored or co-authored over 250 talks

and papers. He served for twelve years on the IEEE Computer Packaging Committee, on the International Electronics Packaging Society (IEPS) Board of Directors from 1990 to 1996, was President of the IEPS in 1996, and was instrumental in merging IEPS with ISHM to form IMAPS. He was an Associate Editor of the IEEE CPMT Transactions Part B, Advanced Packaging, from 1992 to 2000. He served as a member of the CPMT Board of Governors from 1998 to 2001. He serves on the organizing committees for both the IEEE Japan Systems Packaging Workshop and the Japan VLSI Packaging Workshop, for which he is currently Vice Chair.

Len is a Fellow of the IEEE and IMAPS, and is a member of Tau Beta Pi and Eta Kappa Nu. He received an Outstanding Paper Award for his 1994 paper at ECTC, a Best Paper Award for his 1996 IEPS Symposium paper, and an Outstanding Paper Award for his 1997 MCM Conference paper. He was awarded the 1996 CPMT Outstanding Sustained Technical Contributions Award, for his "many accomplishments in the field of electronic packaging, particularly related to multichip modules." In 2002 he received the William D. Ashman Award from IMAPS "for outstanding contributions to the field of electronic packaging..." He will give an invited keynote talk at the IEEE Systems Packaging Workshop in Italy in January, 2007.

Len wants to return to the BOG to help maintain CPMT's preeminence as the global society leader in electronic packaging.

Region 8:



PETRI SAVOLAINEN (M'95, SM'04) acts currently as Technology Manager at Display Entity, Technology Platforms, Nokia Corporation. He received M.Sc. in 1991 in physical metallurgy and finished his Ph.D. in 1996 in materials science from Helsinki University of Technology.

Petri Savolainen worked as research scientist at Helsinki University of Technology developing novel solder filled anisotropically conductive adhesives. He has served as a project manager in various national and EU projects on electrically conductive adhesives. The research work resulted in patent and commercialized product.

In 1996 he joined Nokia Research Center working in projects dealing with advanced packaging, including CSP and BGA, as well as leading edge printed wiring board technologies. Before joining Nokia Japan in 1999 he lead the team of packaging and interconnects team at NRC. In Japan he established packaging research team and laboratory. Currently he drives validation and verification development activities concentrating on long term reliability and quality improvements for displays with display manufacturers.

Petri Savolainen has more than 40 publications in international conferences and journals. He was a co-author of chapter on anisotropically conductive adhesives in *Conductive Adhesives for Electronic Packaging*, published by Electrochemical Publications.

Petri Savolainen has been an IEEE member since 1995 and a Senior Member since 2004. He served as IEEE CPMT Finland Chapter chairman 2002-2005. He has been actively involved in organizing IEEE International Symposium on Advanced Packaging Materials, Processes Properties and Interfaces as member of organizing committee 2000-2002 and as general conference chair in 2004. He was the vice-chair of organizing committee of the 4th International Conference of Adhesives in Electronics, 2000. He is also a board member of IMAPS Nordic and a member of Society of Information Displays.

Region 10:



PHILIP C. H. CHAN (M'80, SM'95) was born in Shanghai and raised in Hong Kong. He received his BS degree in electrical engineering from the University of California at Davis, where he graduated with highest honors and departmental citation. He received his MS and

Ph.D. degrees in electrical engineering from the University of Illinois at Urbana-Champaign. He stayed at Illinois initially as an IBM Postdoctoral Fellow and later as Visiting Assistant Professor in Electrical Engineering.

Dr. Chan joined Intel Corporation, Santa Clara, California in 1981 as a Senior Engineer in the Technology Development Computer-Aided Design Department. Later he became a Principal Engineer and Senior Project Manager. Dr. Chan has the corporate responsibility for circuit simulation tools, VLSI device modeling and process characterization. In 1990, Dr. Chan transferred to the Design Technology Department of Microproducts Group. There he led a team of engineers that defined and developed a CAD system to design multi-chip module products. This effort led to the first functional 486 based multi-chip module at Intel. He joined the Hong Kong University of Science of Technology in April 1991 as a Reader. He became a Professor in 1997. He served as the Director of Undergraduate Studies, the founding Director of Computer Engineering Program, the Associate Dean of Engineering and the Acting Head and then Head of the Department of Electrical and Electronic Engineering until 2002. He is the Acting Dean of Engineering beginning in January 2003. His research interests include microelectronics devices, circuits, integrated sensors and electronic packaging.

Dr. Chan has been actively involved in local and international IEEE activities, particularly those activities involving CPMT and EDS Societies. He has been very active in organizing IEEE sponsored international and regional conferences. He was the Vice-Chairman of the Organization Committee of IEEE TENCON 1995. He was the Technical Program Chair of Asia South Pacific Design Automation Conference 1999. He has served in various capacities in the IEEE Multi-chip Module Conference, ICCAD, ECTC, IEDMS and EMAP.

Electronic and component manufacturing are expanding rapidly in Asia, particularly in Southeast and East Asia. This leads to the rapid increase in technical personnel who are interested in the technical information disseminated by CPMT. A significant percentage of CPMT membership is now from Asia. Further expansion is anticipated. If elected to the CPMT BoG, I shall help promote CPMT in Asia and particularly in China using my network there. I believe CPMT shall further strengthen the link among the Asian countries, particularly in China. Strengthening the link with

Asia will help the CPMT membership throughout the world as many CPMT members need to interact with partners, contractors and sub-contractors in Asia. Most Asian countries lack a learned technical society such as CPMT. It should be an opportunity for CPMT to expand its membership base.



KWANG-LUNG LIN (M'98, SM'05) received his Ph.D. in Metallurgy from the Department of Materials Science and Engineering of Pennsylvania State University in 1984. He has been with the Department of Materials Science and Engineering (MSE) of National Cheng Kung University (NCKU) since 1985. He has assumed the Director General of the Department of International Cooperation of the National Science Council (NSC) of Taiwan since January 2005. Before joining the faculty position at NCKU, he did a one year postdoc research at Ames Lab-Iowa State University. He was the Director of the Institute of Micro-Nano Technology of NCKU (August~December 2004), the Coordinator of the Metal and Ceramic Program of NSC (2001~2004), the Director of the Precious Instrument Center of NCKU (1998~2001), and the Department Head of the MSE-NCKU (1991~1994). He has served in several international academic society committees including the Materials and Processing Committee-ECTC of IEEE-CPMT, Board Committee Member-IEEE CPMT (Taipei Chapter), Electronic Packaging and Interconnection Materials Committee of TMS, Surface Engineering Committee of TMS. He has aggressively served in co-organizing international academic symposia, as program committee, or as session chairman in the areas of surface modification, electronic packaging and Pb-free solder. The recent activities he has been involved since 2000 include EMAP (2000~2003), Pb-free Solder Symposium of TMS (2003~2005), and ECTC (2004~2006).

The areas of particular interest to Professor Lin are flip chip technology, solder bumping, and Pb-free solders. Part of most important research achievements is the successful development of a new Sn-Zn series solder as well as the understanding of the solid/liquid solder interaction mechanism and interfacial behavior. Professor Lin has published more than 135 international journal refereed papers and given more than 50 presentations in international academic conferences. He has been awarded 16 patents from USA, Japan, and Taiwan in flip chip, solder bumping, and Pb-free solders. He has also received Best Paper Award -Silver Medal (Plating and Surface Finishing Society (USA, 1997), Distinguished Research Award (NSC, 1997, 1999), Outstanding Engineering Professor Award (Chinese Engineering Society-Taiwan, 1997), C. T. Ho Distinguished Award (2006). He has been invited to deliver invited papers and keynote speeches in many international conferences, the most recent speech was at the International Conference on Nanotechnology and Advanced Materials (Hong Kong, 2006) on a subject of Pb-free solder. He has been serving as referee for a variety of international academic journals as well as project reviewers of the funding agencies of various countries. He is currently the editor of Materials Chemistry and Physics (Elsevier publisher).

He has also been serving as consultant to major electronic packaging industries in Taiwan. A great number of Ph.D. and MS graduates of his group are serving in major electronic packaging industry in Taiwan. Professor Lin is listed (biography) in Who's Who in the World (Marquis Who's Who, 1996), Who's Who in Science and Engineering, (Marquis Who's Who, 1997), Who's Who in Asia and the Pacific Nations (IBC, Cambridge, 1999), Asia Men & Women of Achievement (Reguerdon & Co., Malaysia, 2003), Asia's Who's Who of Men & Women of Achievement (Rifacimento International Publisher, New Delhi, India, 2003), Who's Who in Asia (Marquis Who's Who, 1st ed., to be published in 2007).

IEEE CPMT SOCIETY REPORT

IEEE FELLOWS ELEVATED AS OF JANUARY 2007

The following is the list of the CPMT Society Members that were elevated to IEEE Fellow Status as of January, 2007. The first 6 in the below list were evaluated by the CPMT Society's Fellows Committee, and the others by another Society's.

Jose Schutt-Aine
University of Illinois
155 Everitt Laboratory
1406 W. Green Street
Urbana, IL, 61801, USA

for contributions to modeling and simulation of distributed circuits with applications to signal integrity

Tawfik Rahal-Arabi
Intel Corporation
13300 SW Ascension Dr.
Tigard, OR, 97223, USA

for contributions in the area of microprocessor high speed bus and power delivery designs

Jusheng Ma
Tsinghua University, China
Department of Materials Science and Engineering
Beijing, 100084, China

for contributions to electronic materials and packaging technology

Hiroshi Yamada
Toshiba Corporation
1, Komukai Toshiba-cho, Saiwai-ku
Kohoku-ku, Yokohama, 212-8582, Japan

for contributions to packaging technology of integrated circuits

Philip Ho Chan
Hong Kong University of Science and Technology
School of Engineering
Clear Water Bay
Kowloon, Hong Kong

for contributions to the development of low-cost flip-chip technology

Ho-Ming Tong
Advanced Semiconductor Engineering (ASE) Group
26 Chin 3rd Road, Nantze Export Processing Zone
Kaohsiung, 811, Taiwan

for leadership in leading-edge integrated circuits technology

(continued ...)