



# Consumer Electronics Society

## Newsletter

Fall 2008 ■ Number 4



### From the President

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My last year and my last article for the IEEE Consumer Electronics Society Newsletter as President is both a joyous and slightly sad reminder of growth in all of our lives. I have truly enjoyed helping out with the society, I have learned a lot through many of the senior volunteers in our Society and from the numerous suggestions I have received these past two years. I want to give special thanks to Charlotte Kobert, our Executive Assistant-Conference Organizer-Committee Support person. She has been instrumental in helping keep our Society on track for many years and I am sure she will continue to do so with the next President and our new recently voted in AdCom members.

I would like to welcome the recently elected Administrative Committee members for 2009, Dr. Robin Sarah Bradbeer, Dr. Tomohiro Hase, Wayne C. Luplow, Brian Markwalter and myself. Our terms will expire on 31 December 2011. I want to thank Stefan Mozar who has valiantly enabled the CE Society to try Electronic Balloting this year, though a bit costly, I think it was worth the increase in participation. We will try to use electronics balloting next year and hopefully we will be able to reduce the cost as well. As always, we need volunteers, please consider running for next year's open AdCom slots as well as volunteering to our many open committee positions. Please contact Stefan Mozar at s.mozar@ieee.org.

I am pleased to announce two new CE Chapters that have joined our fold, the recently approved Beijing, main point of contact (Dong Liu at dliu@biigroup.com), and Malaysia, main point of contact Abd Ramli at (arr@eng.upm.edu.my) chapters were formed and we wish them well in increasing their membership and activities in their respective areas. We hope to hear more from them in the near future. If you are interested in starting a chapter in your area, please do not hesitate to contact Stefan Mozar for further info.

Recently I went to see Eagle Eye, an exciting adventure with a twist relating to Artificial Intelligence (AI). Of course with most things in Hollywood the level of reality is not proportional to the level of technology involved in the story line but hey, it's a movie! At least people are more aware of the concept of AI. Along with the recent IEEE Spec-

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<http://ewh.ieee.org/soc/ces/>

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The IEEE Consumer Electronics Society wants you as a member. To join, go to [www.ieee.org](http://www.ieee.org), click on "membership." Click, "Join a Society." You will be able to add CE Society membership if you are already an IEEE member, or you will be able to join as an affiliate if you are not an IEEE member.

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## From the President *continued from page 1*

trum issue related to the Singularity Event (The point in time in which AI's are accepted or recognized as sentient beings in our universe). I am again honored to know that the IEEE Consumer Electronics Society is in the forefront with its new Journal of AI in Games as well as Autonomous Mental Development.

ICCE 2009 [www.icce.org](http://www.icce.org) Jan 10th ~ 14th is around the corner, I know that it will again be an exciting conference filled with good food, exciting lectures and the meeting of old friends with new. I am looking forward to Stu Lipoff's newest activity for the conference, it is supposed to

be a secret but I hear it involves lots of interactive games. I can't wait. On that note, I hear good things are in the works for the Dr. Hase's ISCE 2009 [www.isce2009.ryukoku.ac.jp](http://www.isce2009.ryukoku.ac.jp) conference May 25th ~ 28th in Kyoto, Japan. I can't wait to try Natto Ice Cream and enjoy the cultural beauty of the Classical country side of Ancient Kyoto Japan.

In closing, I want to say thanks again for being a member of the IEEE Consumer Electronics Society by helping us to bring the CE society further into the technical spotlight with so many new journals and avenues of interest. I look for-

ward to working with you all at our various conferences or possibility on one of our new standards that we are developing.

Thanks Again,



*William J. Lumpkins*  
IEEE Consumer Electronics Society  
President 2006 ~ 2008

*(And thanks to you, Will, for the exceptional leadership you have provided to us. It truly has been a pleasure to work with you – ed.)*

## Consumer Electronics Society Invades 2008 IEEE Sections Congress

By Scott Linfoot, Society Secretary

September 18-22nd 2008, Quebec, Canada was the time and place for the 2008 IEEE Sections Congress. Arranged by the Quebec Section of the IEEE (Region 7), it was a melting pot of IEEE members from every corner of the Earth with over 1200 delegates attending.

If this was a Section/Region-based congress, why was the Consumer Electronics Society represented? Well, three members of the AdCom – Scott Linfoot, Tom Coughlin and Larry Zhang were all invited as representatives of their respective sections (UK and Republic of Ireland, Santa Clara, CA and Dallas, TX respectively) so it was an excellent opportunity to show the rest of the world that there was a Consumer Electronics Society and to demonstrate the sorts of activities that we do.

As one of only three societies represented at this congress, it was an excellent opportunity to talk to other volunteers of the IEEE and to describe the goals of the CE Society.

Although targeted at regional activities, there were a number of breakout sessions that were applicable to the Society. Some of the sessions included how to develop standards, the benefits to mem-

bers and the roles of volunteers and how to attract them.

The awards ceremony was excellent. This year's IEEE Medal was given out to Gordon Moore for his work on semiconductor theory. This was an interesting event not totally unlike the Emmys (except without all the celebrities – although, of course, many of the people at this event are celebrities in their chosen fields)

I would like, however, to share something with you all if I may. One shocking revelation that came from our presence at this congress is the few people who had realised that there was a Consumer Electronics Society. Out of the 500 or so people who visited the stand (a tally was taken to measure the impact of our presence), there were surprisingly few people who knew that the CE Society even existed (with only a handful actually being members). 100 people had some idea what Consumer Electronics is all about. The remaining 349 or so were totally oblivious to the existence of our highly important Society, although many of them were glad to see that there was a Society dedicated to the needs of industry instead of the many other (very respectable) societies who tend to verge on the edge of academia.

Most visitors to the stand started with "so, what is the Consumer Electronics Society all about? I didn't realise that there was one." It was, of course, the role of Scott, Tom and Larry to educate them, and they spent 3 days convincing people of the importance of the CE Society and how it fits on the scheme of things. Many of the delegates went away with at least an appreciation of what the society is trying to achieve.

All in all, the event was very positive and even if we didn't recruit a single person (which I find it hard to believe given the number of industrialists that were present), we have taken steps to increase public awareness of the Society and its goals.

On a final note, one of the things that I picked up from the congress is that there is an incentive from the IEEE in that if you recommend a colleague to become a member of the IEEE, you will receive a reduction of \$15 from your next year's dues (up to a maximum of \$90). While you are at it, why not suggest that they join the CE Society? At \$15 per year, it is certainly one of the cheaper societies yet with so many benefits.

# ICCE 09 Schedule-At-A-Glance

“Here are the exciting topics you’ll hear about at the ICCE in January. To register, go to <http://www.icce.org>”

	ROOM N262	ROOM N264		
January 10, 2009	<b>Saturday -- Tutorials</b>			
2:30 PM 6:00 PM	<b>T1.1: Human Interface Design</b>	<b>T1.2: The 3D Graphics Pipeline from an OpenGL ES Perspective</b>		
January 11, 2009	<b>Sunday -- Tutorials</b>			
8:30 AM 12:00 PM	<b>T2.1: Architecture Trade-Offs for Embedded Audio/Video Processing</b>		<b>T2.2: Optical Storage</b>	
2:30 PM 6:00 PM	<b>T3.1: Home Networking in Embedded Devices</b>		<b>T3.2: Vibrant Picture Quality Enhancement for Display Systems</b>	
	ROOM N258	ROOM N260	ROOM N262	ROOM N264
January 12, 2009	<b>Monday -- Conference</b>			
9:00 AM 10:20 AM	<b>Breakfast, Opening Keynote Presenter: René Penning de Vries, NXP</b>			
10:30 AM 12:10 PM	1.1 Personal Healthcare	1.2 Digital Network Aspects in Video	1.3 Optical and Order Storage Technologies	1.4 Video Coding for Communications
12:20 PM 2:10 PM	<b>2009 Monday Luncheon Keynote, Robert Blake, Altera Corporation</b>			
2:20 PM 4:00 PM	2.1 Personal Healthcare		2.3 Audio/Video Playback and Recording	
4:00 PM 4:20 PM	Break			
4:20 PM 6:00 PM	3.1 Human Computer Interaction	3.2 Video Distribution Systems	3.3 Camera Technologies	3.4 Video Coding
6:00 PM 8:00 PM	Welcome Reception - Sponsored by CEA			
January 13, 2009	<b>Tuesday -- Conference</b>			
8:00 AM 8:30 AM				
8:15 AM 9:55 AM	4.1 Networking Platforms and Frameworks	4.2 Synchronization and Equalization	4.3 Image Stabilization for Still and Video Cameras	4.4 Quality and Sharpness
9:55 AM 10:10 AM				
10:10 AM 11:50 AM	5.1 Audio Signal Processing	5.2 Content Analysis in Video Distribution Systems		
12:00 PM 2:10 PM	<b>2009 IEEE Masaru Ibuka Awards Luncheon Keynote, Hideharu Amano, Keio University, Japan Masaru Ibuka Award Winner: Eugene Polley</b>			
2:20 PM 4:00 PM	6.1 Frame Rate Conversion	6.2 Special Session Reconfigurable Consumer Electronics	6.3 Digital Receivers I	6.4 Content Protection
4:00 PM 4:20 PM	Break			
4:20 PM 6:00 PM	7.1 Image/Video Signal Processing I	7.2 Architectures, (Home) Control and Power Systems	7.3 3D Digital Receivers II	7.4 Special Session on Reconfigurable Secure Programmable Systems
January 14, 2009	<b>Wednesday -- Conference</b>			
<b>2009 Closing Keynote Breakfast, Tom Coughlin, Coughlin Associates</b>				
8:45 AM 10:25 AM	8.1 Image/Video Signal Processing II	8.2 Display Systems	8.3 Wireless Services and Networks I	8.4 Automotive AV & Networking
10:25 AM 10:30 AM	Break			
10:30 AM 12:10 PM	9.1 Image/Video Signal Processing III		9.3 Channel Estimation OFDM	
12:20 PM 2:10 PM	<b>2009 Closing Luncheon, Ranga Yogeshwar</b>			
2:20 PM 4:00 PM		10.2 Display Driver Electronics	10.3 Wireless Services and Networks II	
4:00 PM 4:20 PM	Break			
4:20 PM 6:00 PM		11.2 Display Enhancement and Improvement Techniques	11.3 Wireless Services and Networks III	11.4 Automotive AV & Networking



## Digital Storage in Consumer Electronics

Tom Coughlin

published by Newnes Press (a division of Elsevier, March 2008)  
This is an excerpt from a new book by this name written by our own Tom Coughlin.  
The author has kindly condensed the material and secured permission for us to publish it.

### Many types of memory

Memory is a key element in the design of modern digital electronics. Memory allows the retention of information that can be used by the electronic system. Memory is information. This information may be computer files but it can also be digital photographs, home videos, movies, music and other personal and commercial content. The content is what makes these devices useful and digital storage is where the content resides.

Electronic memory may be temporary as is the case for volatile memory, where the information it contains disappears when the power is turned off, or it may be long term memory, or non-volatile memory. Memory may be fast or slow, low power consumption or high power consumption, it may be inexpensive per byte or expensive. It may be part of the microprocessor electronics, a peripheral chip, an internal mass storage unit or an external digital storage device...

### Growth in digital content drives storage growth

Demand for digital storage is driven by the growth in personal family content, by the growing number of entertainment devices in and around the home that require digital storage, by the increasing resolution of personal and commercial entertainment content, and by the growth in the number of channels that people can use to access all types of content.

More consumers have digital still and video cameras, either as stand-alone devices or in convergence devices such as cell phones. Content creation devices such as digital still and video cameras are becoming a common standard application that

can be built into consumer devices. In addition to being ubiquitous, camera resolutions make digital storage demands higher with time.

Families today have many ways to enjoy content. No longer must they be tied to a schedule for programs on the television. Content can be recorded from broadcast, cable or satellite broadcasts on a digital video recorder to play back later. Audio or video content can be downloaded from the internet and listened to on a variety of static and mobile devices such as MP3 players and personal media players (PMPs). This content is likely to be stored on personal computers and possibly backed up to external storage devices.

In an increasing number of homes content may be stored in a network storage device and made available through a wired or wireless network to various static and mobile devices throughout the home. Even automobiles are increasingly containing digital content for entertainment and navigation purposes. In the future all of these mobile and static devices may be part of far more comprehensive home storage network architecture.

Content sharing and access is growing enormously. Content can be downloaded from the internet and watched now or later, it can be brought down to a cell phone through the mobile phone network and is can be shared with everyone via the many growing social networking web sites.

In all cases the resolution of the content that people want is increasing. Content is compressed for two basic reasons. First, it is compressed to get through slow network connections and to speed up downloading. Second, it is compressed to conserve digital storage

space required. Compression can be lossy or loss-less. Lossy compressed content cannot be reconstructed to its original resolution whereas loss-less content can be reconstructed using decompression technology.

With increasing internet connection speeds and the low cost of digital storage capacity today we are likely to see changes in the resolution of content people may want. For instance MP3 files are a lossy compressed format where up to 90% of the original content file is lost during compression. The compression is done with a very fine human hearing compression model so in a noisy environment and with less than optimal acoustic equipment you probably can't tell that there is content missing. With faster internet speeds and low cost storage there is beginning to be a pronounced shift from MP3 to less compressed or even loss-less compressed music formats...

(Table 1.1) can give us an estimate of the acceptable size of storage for various applications at various resolutions, following are some examples:

- A 4-megapixel photo viewer with 20,000 images needs 20 GB
- A 8-megapixel photo viewer with 20,000 images needs 40 GB
- A 10,000 song MP3 player needs 40 GB
- A 10,000 song high definition (HiD) player (like a compressed DVD audio) needs 1.5 TB
- A 100 movie player at VGA resolution needs 70 GB
- A 100 movie player at DVD resolution needs >400 GB
- A combination 20k 4-Mpixel photo, 10k MP3 song, 100 VGA movie player needs 130 GB
- A combination 20k 8-Mpixel photo, 10k HiD song, 100 DVD movie player needs 1.75 TB

## Consumer product price and demand

There are significant differences between the retail and service markets for consumer electronic devices. The retail market is primarily a push market where retailers advertise products and offer various marketing approaches and discounts to persuade potential customers to make purchases. By contrast, the service market, typified by call phone and cable companies, offers the consumer electronics hardware for free, at a discount, or on a low-cost lease basis in order to increase the services purchased as an on-going subscription by the customer.

The retail market for consumer electronic products is very price sensitive and digital storage devices are often one of the more expensive components used in these products. Consumer products are often purchased with discretionary funds so price is a very important factor in a purchase decision. Figure 1 represents the willingness of customers to purchase a consumer device as a function of product price.

Note that SSPL means single spouse permission limit (what an adult could generally purchase without getting into trouble) while NPZ means no permission zone (what an individual could probably buy with no negative repercussions). Clearly the sales volume increases significantly as the sales price declines. The SSPL point is estimated to be about between \$100 and \$200 retail while the NPZ is less than \$99. Above \$200 the purchase is likely to require at least some family discussion before a purchase is made in order to avoid financial problems or at least some level of heated discussion.

## New opportunities for electronic integration

Technologies used in consumer electronic products come from many sources and have varied histories. GPS positioning technologies were originally developed by the military and only in the last 15 years have come into use by consumers. Today GPS-based positioning capability has become one of those standard functions that are being built into con-

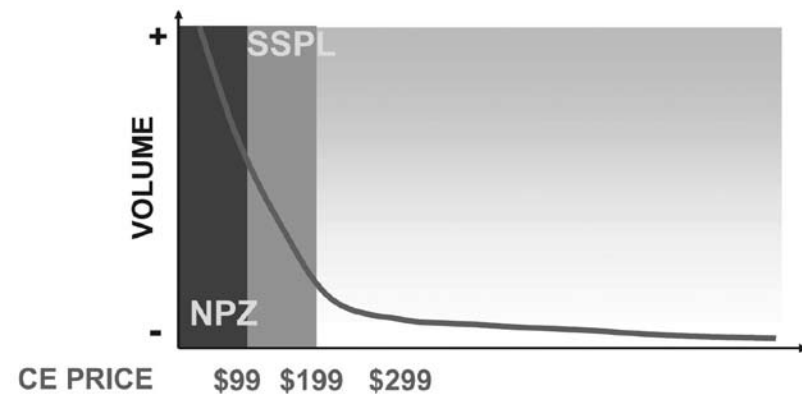


Figure 1 Sales Volume as a Function of Product Price (source: Cornice)

sumer electronic products.

Often consumer electronics product technologies are expensive to manufacture at first and then go down in price as product yields increase and unit volumes go up. Optical disc media product introductions often follow this trend. Every new optical disk format from CD to blue laser discs (HD DVD and Blu Ray) started out costing over \$1,000 per player and decreased to less than \$200 within about 5 years from initial commercial introduction. Consumer markets have market niches, one of which is high end consumers that, for example, put elaborate home theaters in their homes. These early adoption consumers drive the initial market for products and often but not always determine whether a product will be successful in a broader market.

There are many sources of consumer product ideas, but whatever the source they often start out expensive initially and then decrease in price with time. With new technological development, such as less expensive memory they may also develop more capabilities with time for the same or lower prices. Digital storage is one of the key technologies for many of these applications and as indicated, for many products it is one of the largest contributors to the cost of the device. The cost reduction of consumer products is often dependent upon lowering the cost of storage.

Another important factor in the reduction of consumer electronic product cost is to integrate more of the application functions into fewer

and fewer electronic components. This is enabled by smaller and smaller semiconductor line-widths. With smaller area required to make an electronic component more functions can be integrated on a given chip. As discussed later in this book, electronic integration of standard consumer applications and standard consumer oriented commands built into storage products may allow achievement of even greater levels of product integration.

Ultimately digital storage and the electronics could essentially become one produced manufacturing unit. This integration of storage and applications, perhaps enabled by firmware (software programmable functions) could open a whole new era of manufacturing cost reductions. Tighter integration of the overall system architecture with shorter electronic lead lengths would allow faster, more reliable products.

## Rules for design of digital storage in consumer electronics

Based upon observations of what works and what doesn't work in the design of digital storage in consumer electronic products I would like to propose some rules for digital storage design. These rules, if followed, should help make such products more successful in the market place. These rules are:

- Use the most cost-effective storage component(s) that provide enough capacity for the application.
- Never design a product where you

intentionally limit the available storage capacity to the customer—always allow a means of storage capacity expansion.

- If appropriate, incorporate the advantages of multiple types of digital memory to achieve some of their individual advantages. Often a hybrid product using multiple types of storage is better for an application than a single storage device.
- Use electronics and firmware to protect the customer's content and battery life.
- Make it easy to back up and copy data (storage is cheap, time is not!).
- Give consumers a way to protect their personal content and privacy (encryption of data on the storage devices could help with this).
- Make storage management and organization automatic—for instance protect data and prevent replication of corrupt data.
- Design the components including storage to provide lowest total product cost (storage integration concepts could help here)...

### Classification of devices using storage in the home

We classify five types of digital storage devices or devices heavily dependent upon digital storage used in and around the home, including mobile devices and automotive devices. These are:

1. Active devices allowing user interaction with other devices to exchange content files. These include computers, PDAs and smart phones.
2. Drone players that retain content for play out after it has been downloaded from another local source, usually an active device.
3. Direct attached external storage devices used to expand local storage of another device or for backup of content on the other device.. These external direct attached storage devices may use USB, Firewire (IEEE 1394), e-SATA or other less common external interfaces.
4. Network attached external storage devices used to provide a central

content sharing device or centralized backup of content on other devices.

5. Static or mobile personal content creation devices such as a digital still or video camera or perhaps in the future a "life-log" device. Such personal content may then be saved on an active device, a direct attached storage device or a networked storage device...

### Consumer electronics storage hierarchies

We will examine the uses of various digital memories in electronic devices to get an understanding of what sort of trade-offs designers have to make in their electronic designs. Then we will broaden our analysis to look at storage hierarchies for static and mobile consumer applications. We shall use these hierarchies to lay down some general guidelines on what storage to use for different applications, including how different storage devices can be used together to create hybrid storage devices that combine good features of both types of storage...

### Multiple storage and hybrid storage devices

While single storage devices consumer electronic products may give basic functionality they may not provide all the features that customers want. This often leads consumer product designers to build into the device multiple storage devices or external connections to allow for digital storage expansion...

### Chapter summary

- Large digital storage capacities at an affordable price are key drivers of new consumer electronic products. With larger storage capacities consumers can store and access ever larger collections of higher resolution content. The high end audio/video player of the future may easily require several hundred GB of storage capacity.
- The consumer electronics market is a very price sensitive market. Prod-

ucts with prices greater than about \$200 generally sell lower volume than those less than \$200 and the volume increases even further when the price drops below \$100.

- In many consumer products the digital storage is a large part of the total system cost. The initial cost of the storage to the consumer electronics company is magnified by the overhead from the distribution chain to get to retail stores.
- With greater levels of electronic integration possible and with many consumer electronics functions becoming standardized it should be possible to mate consumer applications and storage electronics to result in lower total product cost, greater reliability and faster performance.
- A number of common sense rules have been developed for the design of digital storage in various products in the consumer industry.
- We reviewed memory options and characteristics for cache and main memory of microprocessors.
- Different digital storage devices have different advantages depending upon the application. Since static and mobile consumer devices have some common characteristics we developed digital storage hierarchies that can be used to choose the proper digital storage for the application.
- Different storage technologies can be combined in consumer products to meet technology transitions and to enhance a product so it is more appealing to the customer and to enhance the profitability of the consumer electronics company.
- If one storage technology is directly combined into another storage product we can produce a hybrid storage device. Hybrid hard disk drives combining flash memory as a cache on a hard disk drive are an example of this. Such hybrid products can provide some of the advantages of the individual storage technologies and should be carefully considered by consumer electronic design engineers.

## TI-MSP430 Demo Kits for CE Society Student Chapters

Keith Moore, Industry Relations Officer

One of the benefits of CE Society membership for Student Chapters is access to the Vendor Demo Kit program, wherein students are given products for experimentation and project use. The program is designed to get new consumer electronic devices into the hands of future designers for incorporation into design projects and academic experiments. The companies providing free kits are helping to grow their business and assisting universities in keeping up with current technologies. Students on shoestring budgets gain access to the latest equipment and devices for incorporation in their projects. It's really a win-win situation. The program was initiated by the CE Society President, Will Lumpkins, xillia@yahoo.com, and is being administered by the CE Society Industry Relations Officer, Keith Moore, keith.moore@ieee.org. The program's first vendor to provide gear for students is Texas Instruments (TI) with their MSP430 University Program. TI has provided MSP-430 Development Tool Kits to

the CE Society for evaluation and distribution to student chapters. This developers' kit for ultra low power controllers. It is ideal for use in senior projects and the like. And it's FREE for the asking to CE Society Student Chapter members. Mr. Jacob Borgeson, msp430university@list.ti.com is the TI point of contact.

The MSP430 Development Tool comes neatly packaged in a small box and comes with the following contents:

- Disclaimer sheet stating intended use for Engineering Development, Demonstration, or Evaluation purposes only.
- "Read Me First" sheet that gives links to latest documentation and materials at [www.ti.com/sc/msp430](http://www.ti.com/sc/msp430), inventory, and getting started steps.
- One MSP430 CD-ROM that contains MSP430 Microcontroller Software Tool, Flash Emulation Tool, specifications, user guides, application reports, and data sheets.
- One MSP-FET430x110 Flash Emulation Tool. This is the PCB on

which is mounted a 20 pin ZIF socket for the MSP430 device. A 25 conductor cable originates from the tool.

- One small box containing two MSP430F1121AIDW devices and a Micro Crystal Pierce Oscillator for use with MSP430 devices.



The MSP430 microprocessor platform of ultra-low-power 16-bit RISC mixed-signal processors from TI provides the ultimate solution for a wide range of low power and portable applications. TI provides robust design support for the MSP430 Microprocessor including technical documents, training, tools, and software. TI's overview is at: <http://focus.ti.com/mcu/docs/mcuprodooverview.tsp?sectionId=95&tabId=140&familyId=342>. We sincerely thank Texas Instruments for supporting our students.

## KEYNOTE SPEAKERS AT ICCE

Here are the exciting keynote speakers we'll hear at the ICCE in January. To register, go to <http://www.icce.org/registration/closed.htm>.

Monday 2009 Opening Keynote  
René Penning de Vries  
NXP

René Penning de Vries is Senior Vice President and Chief Technology Officer of NXP, the independent semiconductor company founded by Philips. René is responsible for overseeing the product creation processes at NXP, focusing on the key areas of Innovation, Technology and Research.

René previously held the position of

Senior Vice President and Chief Technology Officer at Philips Semiconductors prior to the formation of NXP in 2006. He started working for Philips Research in 1984 before moving to Philips Semiconductors in 1987 and brings to his position at NXP a deep understanding of the design and technology needs of the semiconductor industry.

Monday Luncheon Keynote  
Robert Blake  
Altera Corporation  
Vice President

Automotive and Consumer Business Unit  
Robert Blake is the vice president of the Automotive and Consumer Business

Unit at Altera Corporation. Mr. Blake is responsible for defining Altera's programmable logic product solutions for applications in the automotive and consumer market segments. He has been developing ASIC and programmable logic for high speed network applications for over 17 years. Prior to Altera he worked at LSI Logic and Fairchild where he worked developing ASIC technology.

Tuesday IEEE Masaru Ibuka Awards Luncheon Keynote  
Hideharu Amano  
Keio University, Japan

Hideharu Amano is a Professor at Keio University, Japan. He received

the Ph.D degree from Keio University in 1986. Dr. Amano was a visiting assistant professor in Stanford Univ. CSL from 1989 to 1990. He is currently a professor in the Dept. of Information and Computer Science, Keio University. His research interests include the area of parallel processing and reconfigurable systems.

Dr. Amano will speak on Dynamically Reconfigurable Processors - flexible off-loading engines for Consumer Electronics. Dynamically Reconfigurable Processors have started to be utilized as an off-load engine for various types of Systems-on-Chip (SoC) in consumer electronics. In order to achieve better area- and power-efficiency compared with traditional field-programmable devices such as FPGAs, they incorporate a simple coarse grained processor, and dynamic reconfiguration of the PE array which enables time-multiplexed execution is introduced. Some of them provide multiple sets of configuration data called hardware contexts and switch them in for one or a few clock cycles, and others can change configuration in several microseconds. Especially in Japan, some of them are embedded in real commercial products such as portable video games and printers.

Wednesday Closing Keynote  
Breakfast  
Tom Coughlin  
Coughlin Associates

Adventures in Speaking (My Year as a CE Society Distinguished Lecturer)

During 2008 Tom Coughlin was a distinguished lecturer for the IEEE Consumer Electronics Society. He gave his talk titled "Storing Your Life" about digital storage in consumer electronics at CE Society chapters in Singapore, Hong Kong, Russia, England, Ireland and at George Washington University. In addition he gave the same talk to groups in Germany and at the University of California, San Diego as well as the University of California, Santa Cruz. Altogether over 300 people attended these talks. Tom will talk about his experiences as a world traveler and representative of the CE Society, as well as share his thoughts of how to be an effective distinguished lecturer.

Wednesday Closing Keynote  
Ranga Yogeshwar

Since 1987 Ranga Yogeshwar has been active as Science Editor at WDR-Germany TV, the nationwide German TV-network of public rights. Between 1995 and 2001, he was Acting Chief and between 2001 and 2005 the Chief of the Science TV Program Group at WDR. Ranga has over 1000 TV shows and many Radio presentations to his credit. He is author/co-author of several newspaper and magazine col-

umns and articles in learned periodicals. He is engaged in many national and international projects and is member of boards and committees of institutions in the fields of Science, Education and Knowledge Propagation. He received many awards and decorations for his work in the field of science communication. In 2008 he founded his company Xplainy. Ranga holds degree of Diplomphysiker in experimental particle physics and astrophysics from Aachen University, Germany. His hobbies center around the family, music and astronomy. The asteroid 20522, discovered by André Knöfel in September 1999 has been named after him. Ranga Yogeshwar is married to the classical soprano singer Ursula Müller. They have four children and live close to Hennef near Cologne, Germany.

His talk is entitled Generation "New"- Does Innovation Change Our Culture? At any time in history we have seen a comparable transition within society. Today the speed of innovation has reached a critical pace: Mobile communication, broadband internet, new media etc. have changed our life in a fundamental way. The generation gap is widening and new global business structures challenge our traditional models. Leaps in innovation induce disorientation within enterprises and in societies. How is innovation changing our culture?

## SHORT CIRCUITS

What's hot in Consumer Electronics now, with a lot of young adults buying? Would you believe, vinyl records. Analog. Those 12 inch disks that we grew up with, but which went out of style about the time today's young adults were born. See <http://washington-times.com/news/2008/jul/28/>

groovin-on-vinyl/. It seems that as we progress, we don't quite abandon the old. One of the hottest categories in professional audio is and has been preamplifiers using, of all things, tubes. There are a couple of plants in Russia producing tubes still, because there is a market. Some

people will tell you that tubes sound better than transistors. Yeah, but just try building a miniature .mp3 player with tubes!

Speaking of the old, you will be fascinated by the bit of cold war era technology on display at <http://www.eham.net/articles/19887>. It took me back to my college days.

## LETTER TO THE EDITOR

In the summer edition, our Associate Editor Jianping Zhou had a piece requested by your editor regarding interlace vs. progressive scanning in modern video displays. Your editor has long had the suspi-

cion that the difference is overstated in popular literature today, given the way modern persistent displays work, as opposed to the way CRT displays worked. As usual, this article solicited reader

response that, along with follow-up responses from both the writer and reader, shed more light on the subject. Keep those responses coming! That's what makes this job so interesting.

---

I very much enjoyed your article in the Summer 2008 edition of the IEEE "Consumer Electronics Society Newsletter"! Thank you for the opportunity to provide you with comments from an individual perspective.

Original television standards were developed with bandwidth limits of their transmission systems in mind. The same is true today except the transmission and transport systems are significantly different in physical and bandwidth terms. The end viewer's expectations for quality seem to vary according to the circumstances in which the media is consumed. What a viewer expects within a theater, within their homes and in the mobile environment seem to be quite different now. There appears to be a range of quality tolerance that is quite wide. That said, the quality delivered can be a major competitive edge so continuing improvement is also expected by the sellers and generally of value to the buyers. Visual media delivery has depended and still depends on response to key environmental and human factors, some of which are:

1. The human eye & its characteristics (viewing angle, distance, 'refresh rate' allowed by light/retina/synapse/brain interpretation speed.
2. The content owner/producer desired quality
3. The size of the ultimate display surface
4. The allowable time between content source and end viewer
5. The number and nature of segments in the transport system between content source and end viewer.

6. The expectations of and the quality desired by the end viewer along with that viewer's willingness to pay for the viewing or not.

With adequate storage, video content can be encoded at various levels one time and stored for selection. The encoding process, in effect, fixes the resolution and quality of the image at some point using whatever algorithm and settings are available in the encoder. The operator of the encoder can affect the quality, file size and bandwidth needed by careful selection of what variables to adjust within the algorithm and the encoder. The final 'quality' of the image ultimately depends on the ability of the decoder to reconstruct the image as faithfully as the amount of compression allows to meet the intent of the original operator of the encoder AND the integrity of any transport system between the source and end view. The receiving system reconstructs the image using whatever systems are integrated into it, which hopefully meet standards extremely accurately. Lastly, the physical and electrical construction of the displays used today are significantly different from those used for video in the past.

I would submit the discussion of a preference for interlacing versus progressive scanning may already be moot. Ultimately the encoding of visual content is undertaken to reduce the burden on whatever transport system exists and whatever storage capacity exists while making the visual content meet the expectations of the end viewers in whatever context into which the media is imported for use. The ultimate cost for all this must be that which enables viable businesses to

be maintained in the various industries supporting the media generation, sale and delivery. I also believe the terms *progressive* and *interlaced* have significance in the marketing of visual media products because the consumers have come to believe progressive scanning delivers higher resolution. If one examines the mechanisms of actual picture generation within most of today's digital display devices, there is scanning if you consider the refresh process used to change or maintain images so the human eye sees a whole image intact, but it is not really the same as CRT units. I am no expert here so there is a risk of being incorrect but I hope the reader gets my point.

The terms *interlaced* and *progressive*, when used with the word *scanning*, still have meaning to consumers who feel there is a link to picture resolution and quality. I do not feel it is worthwhile to debate the terms in actual technological terms. Our goals should be to produce a visual experience that meets or exceeds the end viewers' expectations and that enables viable economic support for the artistic and business entities within the industry. In the end, the technology should be as transparent and as user-friendly as possible to the paying consumer while it delivers the product and experience desired (or allowed depending on local regulatory environments).

Thank you for the opportunity to respond!

Best regards,  
Wayne Hall  
Regional VP Engineering  
Comcast Cable Communications

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The author responds,

Hi Wayne,

I'm very glad to receive your response. Thank you.

I agree with you that the visual image quality depends on the entire video transport, storage, and display ecosystems. We should also

take image capture into consideration. That is the video source, which is before any encoding or decoding. As imaging sensors and camera modules become cheaper and cheaper, more and more devices integrate cameras (such as digital camera, camera phones, PDA), and more and more videos are captured and shared by ordinary people. Digital cameras are usually

producing progressive videos. Their choices are influencing the ecosystem.

Best regards,

*Jianping (Jumping) Zhou  
Senior Imaging Architect  
Intel Corp  
Santa Clara, CA  
jianping.zhou@gmail.com*

---

And the writer further responds,

Jianping,

Thank you for your e-mail! I appreciate your taking the time to respond.

You are absolutely correct. The image quality is definitely defined by the capture process! I neglected to consider that to any degree as my focus is conversion from analog

video formats to standardized digital transport streams.

In my profession my involvement is mainly with the conversion and compression involved with moving from analog to an MPEG format for transport and decoding by the customer device at the end of our networks. As a result, I think mainly in terms of the effects of that process and moving the digital information

through the network and decoding process with the lowest error count and highest customer satisfaction possible with bandwidth consumption a prime focus.

Again, thank you for your e-mail and time!

Best regards,

*Wayne*

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### **USB Music to the Ears**

The recent article by Tom Coughlin about the eSATA interface was very interesting. Where will it all end? Unfortunately, Moore's law, lower cost and clever new products just keep going on. I am working with a company in Japan and Korea to replace the CD with a flash drive. When the price per GB memory gets a little lower we are thinking to market pre-recorded music on a flash. When one goes to the music shop to purchase a CD it will be on a flash device with the same music, but the

small size. It may or may not have a USB connector - probably depending on the publisher. It will be just a little larger than a USB flash drive in order to contain a small replaceable battery and an audio amplifier that powers the headphones directly. Such a device will allow the music companies to continue selling albums as well as make it easy to sell customized albums. Of course, the recording format will be compressed audio such as MP3 in order to keep the data rate down and the storage requirements at a minimum. But, I

am thinking that with the eSATA interface we could have a lossless, full redbook CD grade digital audio or higher and a small custom recording studio in the retail shop to make albums on demand using the highest quality audio signals. But cost is always important in the consumer marketplace so we will be watching the development of eSATA and other such high speed interfaces in the future.

*Almon H. Clegg  
Independent Consultant  
Life Senior Member IEEE*



Wendy Aylsworth  
SMPTE Engineering Vice President

Mr. Will Lumpkins, President  
IEEE Consumer Electronics Society  
Via email: xillia@yahoo.com

Dear Mr. Lumpkins,

The Society of Motion Picture and Television Engineers (SMPTE) has formed a Task Force on “3D Home Display Formats.” The purpose of this effort is to define what content mastering standards would be needed to establish easy distribution of stereoscopic image content via multiple types of distribution channels (e.g. packaged, broadcast, satellite, cable, internet) for the purpose of rapid adoption of this content on a fixed home display. The Entertainment Technology Center (ETC) will host this Task Force’s inaugural meeting at the University of Southern California in Los Angeles on 19 August, 2008. While all are welcome to this initial meeting, SMPTE membership will be required for ongoing participation. Demonstrations of technologies in this space will be provided. For further information and registration please visit:  
[http://www.smpete.org/standards/meeting\\_schedule/](http://www.smpete.org/standards/meeting_schedule/)

As a leading organization in the consumer electronics industry, IEEE CES will be a key organization to which SMPTE wishes to liaise on this topic. Please feel free to distribute this information to your membership and communicate back to SMPTE any information which may be relevant to the subject.

Best regards,

A handwritten signature in black ink that reads "Wendy Aylsworth". The signature is written in a cursive style and is positioned below the "Best regards," text.

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## CALLS FOR PAPERS

IEEE Transactions on Instrumentation and Measurement, Special Issue on Biometric Instrumentation and Measurement: <http://www.dti.unimi.it/~piuri/pages/TIM-SpecialIssueBiometricIMCFP.pdf>. The submission period is February 15 - March 1, 2009.

IEEE Systems Journal, Special Issue on Biometrics Systems: <http://www.dti.unimi.it/~piuri/pages/ISJ-SpecialIssueBiometricsSystemsCFP.pdf>. The submission deadline is January 15, 2009.

## CEA PROJECTS

Our Society has long maintained a close working relationship with the Consumer Electronics Association, and our ICCE conference in January is a partner conference of the CEA. Here is a sample of some of the projects going on at the CEA.

CEA's Technology & Standards Council is investigating the need for standards to address delivery and presentation of three dimensional (3D) video in the home. For consideration of new standards areas, CEA uses a process called a Discovery Group to gather experts, share information on the state of the art, determine the need for standards within CEA's domain and ensure volunteers are available to work on projects. There is widespread interest in 3D video across the entire production, delivery and viewing chain. Movies are being produced and shown in 3D in cinemas, with advances in digital cinema improving the experience. Pre-packaged content and games have the storage and processing power to deliver 3D video. Televisions are available today that can render 3D content. The industry may be benefited by standards that ensure 3D content is usable to the maximum extent by consumers. For more information contact Brian Markwalter at [bmarkwalter@ce.org](mailto:bmarkwalter@ce.org) or Alayne Bell at [abell@ce.org](mailto:abell@ce.org). A number of other industry groups are also working on various parts of the needed 3D standards, including SMPTE, the DVD Forum, and SCTE.

**Call for Participants: ATSC-Mobile/Handheld Special Interest Group:** CEA is forming a Special Interest Group (SIG) to give its members a venue to share information about Advanced Television Systems Committee mobile/handheld technology (ATSC M/H). The SIG will help the consumer electronics industry understand this technology and its market dynamics.

ATSC M/H allows TV broadcasters to use part of their signals to deliver services that can be reliably received by handheld devices and receivers in moving vehicles. Broadcasters have expressed a keen interest in launching mobile services to coincide with the 2009 holiday selling season. U.S. broadcasters, representing more than 800 TV stations, formed the Open Mobile Video Coalition (OMVC) to accelerate the development and rollout of mobile DTV services.

CEA members interested in joining the SIG should contact Jack Cutts at [jcutts@CE.org](mailto:jcutts@CE.org) or Brian Markwalter at [bmarkwalter@CE.org](mailto:bmarkwalter@CE.org).

**Call for Participants: Remote User Interface (RUI) Test Specification for CEA-2014-A Web4CE:** R7WG9 Enhanced UPnP Remote User Interface Working Group is seeking knowledgeable participants to help develop a compliance and test specification for CEA-2014-A, Web-based Protocol and Framework for Remote User Interface on UPnP™ Networks and the Internet (Web4CE). If you would like to contribute to this new work effort, please contact Leslie King at [lking@CE.org](mailto:lking@CE.org).

In addition to these projects, CEA is working on many other programs of interest to CE Society members. One new project, DTV Audio Metadata, is a new recommended practice that would help consumers more easily navigate to secondary audio programs (e.g., alternate language feeds) in DTV signals.

There are more programs going on than we have space to describe, but a few representative projects include

- The Antennas Committee is considering the development of guidelines or recommendations for consumers who are using indoor TV antennas. The computer prediction models that it developed for [www.AntennaWeb.org](http://www.AntennaWeb.org) only apply to outdoor antennas.

- The Audio Systems Committee is conducting its five year review of CEA-9, Standard Method of Measurement for Phonograph Cartridges Used in Analog Disc Playback Equipment. This standard describes standard test conditions and procedures for testing an electromechanical phonograph cartridge transducer. It also defines a method for reporting test results. (Yes, you read correctly, this applies to vinyl record reproduction – remember analog? Well, it is still around. –ed.)
- Another Audio Systems Committee working group is working on an amplifier measurement standard aimed mainly at home theater in-a-box systems, but which would include some other audio amplifiers as well. There is hope that this standard, and perhaps an accompanying CEA logo program, may help ensure consumers' ability to make apples-to-apples comparisons among these types of products.
- The Home Systems Control Subcommittee approved CEA-852-B, Tunneling Component Network Protocols Over Internet Protocol Channels. This standard specifies a communications method that allows networked data acquisition and control devices to communicate with each other over the Internet.
- The Home Networks Committee is nearing completion of CEA-2002-A, Test Procedure for Powerline Carrier Technology. This standard defines a test procedure that can be used to validate key aspects of power line carrier systems.
- The Video Systems Committee has begun work on CEA-CEB20, A/V Synchronization Processing, a bulletin that will recommend methods for synchronizing audio and video content at the receiver using time stamps in MPEG-2 transport streams.

# SAMPLING THE CONSUMER ELECTRONICS TRANSACTIONS OVER 100 PAPERS TO CHOOSE FROM

By George Hanover IEEE/AAAS Fellow

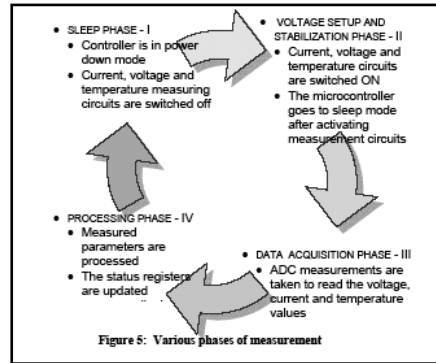
## 3D TV Is Layered On Standard DTV Using New Pixel Format

Three dimensional TV can be right around the corner according to *The Design and Implementation of a Stereophonic Microdisplay Television*. Using the same technology already in consumers' television receivers, David Hutchison et al., the paper shows that cross talk, resolution, and update rate can be preserved by going to a diagonal arrangement of the pixels in micro-mirror displays. The paper also notes that the signal processing in the receiver is added rather than changed so that backward compatibility is preserved. Subframes consisting of half the pixels, but displayed at double the display rate contain the left-eye/right-eye information. Using the same clocking signal, the displayed l-r frames are synchronized to shutter glasses worn by the viewer.

See Page 254\*

## Fuzzification Fixes Focus Foibles

Improved focusing in optical disk players is achieved by using a version of fuzzy logic to process the error signal generated by the mis-focus of the laser due to disk warpage and production tolerances. *Adaptive Fuzzy Logic for Focusing Optical Disk Player* by Yong Choi et al. identifies four elements to generate the needed output action to initially focus and



refocus the beam quickly and with less residual error than conventional servos:

1) fuzzification of the input data, 2) imbedded human expertise and knowledge on the focusing control system, 3) decision-logic using the fuzzy data and 4) the output interface to the laser head servo.

See Page 545

## Processor Monitors Battery Reserve Time With Improved Accuracy

You're on the plane with a 4 hour flight ahead of you. It's a good time to write that report you've been putting off since last Monday (or was it a week ago last Monday?) The laptop is fully charged according to the battery monitor. About 2 hours into the flight and the report you check the percent battery use. It says you're still ok with about 25% left. But after another half hour you get the dreaded warning: Battery Low. Charge Now. What's going on? According to the paper *Micro Power*

*State-of-Charge Monitor* by Tanvir Singh Mundra et al, current battery monitors have an accuracy of only 20% and themselves are a significant load on the battery. Such parameters such as battery age, and environmental temperature are taken into account to predict discharge reserve time (what you're really interested in) within 5%. The monitor circuit is processor based and uses a sampling technique to keep its own power consumption down.

See Page 623

\*The complete papers highlighted here and others are available to CE Society members in volume 54 Number 2 of the *IEEE Transactions on Consumer Electronics*, either in print or through the members only page on the CE Society web site. As part of your membership, you can now electronically access the entire text of the Transactions on Consumer Electronics from the present volume to those published as far back as 1988. To use this benefit, you must create an IEEE Web Account by going to the IEEE website at [www.ieee.org](http://www.ieee.org), and click the link to Web Account. Once your account is set up, go to the Xplore home page at <http://ieeexplore.ieee.org/> and you'll be able to link to the Transactions. You will need to sign in using your web account before you can gain access to the complete articles.

## CE SOCIETY TURNS THE SPOTLIGHT ON STUDENTS

Fostering interest in consumer electronics among students is an increasing important objective of the Consumer Electronics Society. A new Student Member Service Committee is looking into ways to make membership in the CE Society a more rewarding and educational experience for students interested in this fast moving, lively field.

### Student Communications, ICCE Activities, Chapter Support

One of its important committee goals to open student members and chapters communicate channels so that they can swap information among themselves. So as a start, the Newsletter will launch a student column featuring chapter activities, and individual student achievements to name a few.

Our new Industrial Relations Program encourages corporate support of student chapter activities. For example, Texas Instruments is providing their MSP430 development kits to existing chapters.

The International Conference on Consumer Electronics is the CE Society's largest yearly gathering. The ICCE executive committee plans to offer more conference activities including sessions, contests and projects especially for student members.

### Existing Benefits

CE Society student members already have benefits including on-line access to our Transactions, hard copies of the Newsletter as well as the special Consumer Electronics Associations Vision Magazine. Student chapters can participate in our Distinguished Lecturer Program and

receive financial support.

### Help Wanted

Of course students are the people who know best about what kinds of benefits and support the CE Society can give them so suggestions and comments are not only welcome but encouraged.

Steve Chao is chair of the Student Member Service Committee. Members are Dan Eisenman and Konstantin Glasman. All are already involved in CE university activities.

and will work with students primarily within student branch chapters and especially with their chapter advisors. Their email addresses are [stevechao@giga.net.tw](mailto:stevechao@giga.net.tw), [eisenman@gmail.com](mailto:eisenman@gmail.com) and [k.glasman@gmail.com](mailto:k.glasman@gmail.com).

Please contact them with your ideas, comments and to volunteer.



### Webmaster Marries

Congratulations to our webmaster and GOLD liaison, Teodor Buburuzan and his lovely new wife Diana, who were married recently. This photo shows our Dr. Ulrich Reimers and his team forming an honor guard with red roses in front of the town hall in Braunschweig. Buburuzan is Romanian and means: "Ladybug".



### AdCom Meets

Our Society is governed by an Administrative Committee (AdCom in IEEE-talk), composed of volunteers who devote their time and energy to advancing the state-of-the-art in consumer electronics. The AdCom meeting monthly by telephone and several times a year in person. This meeting was in August, in conjunction with the ICCE Paper Selection Committee's meeting at the Consumer Electronics Association offices. We appreciate the services of these and many other fine volunteers who make our Society what it is.



### Student Branches Multiply

Under the leadership of Steve Chao, our student branches are multiplying. This photo is of the preparation meeting for the Taiwan NCTU Student branch, which was registered with IEEE Student Branch Services in July, 2008. About 20 students from the class of 2009 are participating. Chanyau Chen is chairman. CES Taipei Chapter Chair, Prof. T.H. Chiang, is a mentor, as are Industry liaison, Prof. Steve Chao and Seminar liaison, Prof. Winston Fang. The Society offers a lot of support for the student chapters, our source for future generations of leadership.



# IEEE

## Are You Registered?

## ICCE 2009



### 27th International Conference on Consumer Electronics



January 10-14, 2009, Las Vegas, NV, USA [www.icce.org](http://www.icce.org)  
co-located with the International CES



International CES.....Thurs-Sun, Jan, 8-11, 2009  
ICCE Tutorials.....Sat-Sun, Jan, 10-11, 2009  
ICCE Conference.....Mon-Wed, Jan, 12-14, 2009

## Save The Date!

### The International Symposium on Consumer Electronics (ISCE)

May 25-28, 2009  
Kyoto, Japan

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