

Consumer Electronics Society

Newsletter

Summer 2008 ■ Number 3



From the President

William Lumpkins
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Summer is upon us, the blistering heat, the cool swimming pools and walks on the beach. (I am being hopeful on the last thought; I am a long way from a beach). I have just come back from another exciting Technical Activities Board meeting, where all the Society/Council Presidents meet to handle inter-Society issues and help to drive the IEEE forward. During this meeting our joint Transactions on Autonomous Mental Development with the Computational Intelligence Society has been approved. We are now looking for Associate Editors and for a Technical Management lead (Which can also be an Associate Editor) to help drive this organization. If you would like to help please drop a line to our Executive Administrator Charlotte ckobert@zbzoom.net ; due to an odd bit of politics the Laser and Optics Society had decided to be the sole financial sponsor of their Journal on Photonics, though we will still be partnering with them on the Journal on Displays. Again we need your help with Associate Editors. Our Society will be technical co-sponsors of the Computational Intelligence Symposium in Perth Australia this coming December <http://www.csse.uwa.edu.au/cig08/>, this looking to be an interesting event to help us focus on a few new joint activities that both of our Societies are involved with. Oddly, at the TAB meeting there was a presentation by IEEE Spectrum on the Singularity Event <http://www.spectrum.ieee.org/jun08/6306> , which falls into the category of the Transactions on Autonomous Mental Development. Of course "The Right Hand doesn't know what the Left Hand is doing." Hopefully we can pull some of our joint resources together to spread the word on this interesting topic.

On the student chapter front, thanks to Steve Chao & Dr. Tihao Ching, we have a new student chapter in Taiwan. I hope we can all welcome the National Chaio Tung Univ. Consumer Electronics Society Student Chapter. Along these lines, Keith Moore, our Industrial Relations officer, and I have taken further steps to solidify our relationship with the Texas Instruments MSP430 Microcontroller group. Texas Instruments has committed to provide our student chapters with state-of-the-art development kits for their student projects and as a way to bolster the CE student chapter membership. TI is also interested in

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<http://www.ieee-cesoc.org>

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The IEEE Consumer Electronics Society wants you as a member. To join, go to 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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taking an active role in promoting at some of our internationally attended conferences. We have high hopes that the CE Student chapters can be strong drivers of our continued growth of the CE society. If you know of a University that might be interested in starting up a CE Student chapter, don't hesitate to contact Daniel Eisenman our Student Member Vice-Chair at eisenman@gmail.com.

I would like to thank Dr. Simon Sherratt for stepping up to take the VP of Conferences post this past quarter, Simon will be the lead oversight manager into all of our CE Society Conferences, he is currently coordinating the ICCE and ISCE conferences and I

believe is looking into creating other new conferences worldwide. If you have an idea or would like to lead the charge in setting up another conference please contact Simon r.s.sherratt@reading.ac.uk.

Towards the end of this summer, I will be heading off to China to meet with the IEEE China office to see about promoting the CE society in China and hopefully creating more chapters in China. If we have any Chinese members that can provide some leads for individuals that would like to start up some Chinese chapters, drop me a note. If you are interested in starting up a CE chapter in your area, please contact Stefan

Mozar.s.mozar@ieee.org

The year is looking to be very busy with many new conferences and activities, as always we welcome your insight and suggestions. I look forward to our upcoming election in November for the new Adcom officers, please submit yourself for consideration. We are a fun group that works hard to make our Society great. As an Adcom officer you are expected to attend the face-to-face meetings and attend the conference calls. There is so much work to do and so little time to do it. So thanks again for being a dedicated CE Society member and don't hesitate to drop me a line to say "Hello," at xillia@ieee.org.

INTERLACING VS. PROGRESSIVE SCANNING

Jianping (Jumping) Zhou, Associate Editor



Interlacing and progressive are two different television scanning methods, which require different video capture, storage, transmission, and display systems. There are a lot of claims today in the popular and hobby press of interlacing versus progressive, 1080p versus 1080i, and so on. Some writers with little or no real knowledge have written some things that do not seem right to me. So we would like to have a discussion on interlacing and progressive methods and their implication. Please send your thoughts regarding interlaced vs. progressive scanning with modern video displays, to jianping.zhou@gmail.com, with a copy to jofarmer@mindspring.com. Does the old wisdom of progressive scanning producing a better picture still hold with modern, persistent displays? We will publish your thoughts with attribution, unless

you ask us not to publish them, or to publish but withhold your name.

Television started with cathode-ray tube (CRT) display devices in 1930s. The CRT display is based on impulse pixels, and those pixels fade away quickly if they are not refreshed. If we do not refresh the CRT display as often as necessary, we will see flicker artifacts. To avoid these artifacts, the CRT display requires high refresh rate, which generates a huge amount of data for television broadcast and receiver systems. The European and most Asian countries used the PAL (Phase Alternating Line) system, while North America and Japan used the NTSC (National Television Standard Committee) system. Both of them use 720 pixels per line in a CIF (Common Image Format) picture. However, the PAL system specifies 576 lines for CIF pictures and 50 frames per second, while the NTSC system specifies 480 lines and 60 (later adjusted to 59.94) pictures per second. If progressive scanning had been used, the maximum video frequency would be 10.368 MHz for both PAL and NTSC systems, which was beyond the transmission system capability.

Interlacing technology was introduced to reduce bandwidth requirements with the same refresh rate. In interlaced scanning, all the odd lines are scanned before all the even lines are scanned. Although a complete picture is composed of one odd field and one even field, the persistence of human vision results in a perceived continuous image. One direct result of interlacing is that the required frame rate, and the resulting transmission bandwidth, is reduced by two. Specifically, the frame rate for the PAL system is reduced to 25 and the frame rate for the NTSC system is reduced to 30 (later adjusted to 29.97). The interlacing technology greatly reduces the amount of information sent for each image without introducing display flicker. Interlacing reduces the video transmission bandwidth by half for analog and uncompressed digital video and less than half for compressed digital video (since interlacing reduces compression efficiency). However, when the video consists of fast-moving objects or very

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**The 13th IEEE International Symposium on Consumer Electronics
May 25-28, 2009, Kyoto, JAPAN**

Call for papers

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Conference Coordinator
Charlotte Kobert, *USA*

The 13th IEEE International Symposium on Consumer Electronics (**ISCE2009**) will bring together top technical professionals from consumers, industry, and academia to exchange information and results of recent work on systems, circuits, technologies, processes and applications.

ISCE2009, the 13th in the annual series held since 1997, will provide a forum for researchers, system developers, and service providers to share ideas, designs, and experience in this emerging technology. ISCE is a truly international event and a sister conference to the successful International Conference on Consumer Electronics (ICCE) held in the USA.

ISCE2009 will be hosted in Kyoto, Japan, by the Tokyo Chapter of the IEEE Consumer Electronics Society.

Topics

ISCE2009 is asking for submissions of technical papers for oral and poster presentations. Student papers are particularly encouraged. Papers reporting new developments in all areas of consumer electronics are invited, including but not limited to those listed below.

All papers will be published at IEEE Explore. Besides, full length versions of the best papers from the ISCE Conference, not published elsewhere, can be submitted for publication consideration in the IEEE Transactions on Consumer Electronics.

HOME ENTERTAINMENT

Home Gateway, DTV, Home Theater, PVR, Interconnects, Game Systems, Interactive and Directed Programming, Internet Integration, Next-Generation DVD, Displays

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ENABLING TECHNOLOGY

Advanced Semiconductors, High Speed Signals and Interconnects, Algorithms, OS, Development Tools, Intellectual Property, Special-Needs/Assistive Technology, Recyclable/Green Engineering, Manufacturing and Test Technology for Consumer Electronics, Product Safety, White Goods, Storage Technology

For more information in detail contact

<http://www.isce2009.ryukoku.ac.jp>
info@isce2009.ryukoku.ac.jp

Important Dates

Special Session Proposal:
Nov. 21, 2008

Short Paper Submission:
Dec. 19, 2008

Notification of Acceptance:
Jan. 30, 2009

Camera-ready Submission:
Apr. 3, 2009

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fine details, interlacing may introduce interline *twitter artifacts*. A vertical lowpass filter is applied to the picture to mitigate these artifacts.

For compatibility, most CRT-based televisions still use interlaced scanning. In contrast, modern flat panel displays, such as LCD (Liquid Crystal Display), DLP (Digital Light Processing), and plasma displays have persistent pixels. They are fully

flicker-free and do not need to maintain high refreshing rate. Therefore, they are using progressive scanning and do not display interlaced format directly. Since progressive format is necessary for digital image and video processing, editing, and management, computer displays (including CRT displays) use progressive scanning too. In addition, most HDTV (High-Definition Television)

displays are using progressive scanning, which provides higher video quality than interlaced scanning. Since old broadcasting systems are still using interlaced format and old television programs were already made in interlaced format, these progressive displays require some form of deinterlacing technology to convert interlaced format to progressive format.

CARL G. EILERS, 1925 – 2008 FATHER OF STEREO FM AND STEREO TV

Carl G. Eilers is considered the “Father of Stereo FM Radio and Stereo Television Sound,” for pioneering work during his 50-year career at Zenith Electronics LLC. Eilers died June 20 in his River Forest, Ill., home. He was 83.

Eilers joined Zenith in 1948 after receiving his bachelor’s degree in electrical engineering from Purdue University. Through 1961, he worked on the world’s first pay television system, Zenith Phonevision, earning key patents on subscription TV technologies.

During that period, while pursuing his master’s degree in electrical engineering, which he earned in 1956 from Northwestern University, Eilers led Zenith’s development effort on stereophonic FM radio broadcasting. The stereo FM standard he co-developed was first adopted by the Federal Communications Commission in 1961 and is still in use today around the world.

Two decades later, as R&D manager, Eilers co-developed the stereo TV system adopted by the industry in 1984. Through the 1990s, Eilers was a key member of Zenith’s high definition television (HDTV) development team.

Over the years, Eilers had been granted 21 U.S. patents, and authored numerous technical papers and articles. He was always been recognized as a great teacher and mentor to scores of young engineers, both at Zenith and throughout the television, radio and audio industries.

His many others honors included the 1977 Fellow Award from the Institute of Electrical and Electronics Engineers (IEEE), the Best Paper Award of the IEEE Broadcast Technology Society in 1984, the Audio Engineering Society Fellow Award in 1993 and the IEEE Masaru Ibuka Consumer Electronics Award in 1994 (“for pioneering contributions to FM stereophonic and television multichannel sound broadcasting systems”), as well as Zenith’s E. F. McDonald and Robert Adler technical excellence awards.

Eilers was inaugurated into the Consumer Hall of Fame in 2000. The Consumer Electronics Association (CEA) recognized him for “high-fidelity stereo sound that revolutionized the radio listening experience,” as well as enhancing the TV viewing experience. CEA said Eilers “holds a unique



Stereo TV co-inventor, the late Carl G. Eilers, left, in the Zenith R&D Lab with fellow engineer Pieter Fockens in 1984 when the industry adopted the multichannel television sound system.

place in the annals of consumer electronics technology history as co-developer of two key industry standards...”

He had been a member of the Institute of Electrical and Electronics Engineers (IEEE) since 1947, the Society of Motion Pictures and Television Engineers (SMPTE) since 1956, and the Audio Engineering Society (AES) since 1973. He served as both a member and chairman for a number of their special committees.

He served in the United States Navy from 1943 to 1946. He graduated from Purdue University, West Lafayette, Ind., with his bachelor’s degree in electrical engineering, in 1948, and received his master’s degree in electrical engineering from Northwestern University, Evanston, Ill., in 1956.

Eilers was born March 21, 1925 in Fairbury, Ill. He and his wife of 34 years, Sandra (nee Mahler), were long-time residents of River Forest, Ill. In addition to his wife, he is survived by his son John Eilers and daughter Janet Ames.

DVB-T2 HAS ARRIVED

U. Reimers

(First Vice President of the IEEE Consumer Electronics Society and Chairman of the Technical Module of the International DVB Project)

On 26 June 2008 the Steering Board of the International DVB (Digital Video Broadcasting) Project (www.dvb.org) approved the specification of the second generation terrestrial broadcasting system, DVB-T2. This specification is the result of the co-operation of some 60 engineers and researchers from some 45 companies from around the world who worked tirelessly over a period of about a year to turn technology ideas into a complete system.

Like DVB-T, DVB-T2 uses Orthogonal Frequency Division Multiplexing (OFDM). Over the years this modulation scheme found more and more supporters not only in broadcasting standards (such as DAB, DVB-T, ISDB-T, T-DMB, DVB-H, FLO, DMB-T/H, DVB-SH), but also in communications technologies such as WiMAX. DVB-T2 supports a number of OFDM variants ranging from 1k carriers (using effectively 853 active carriers across the frequency band) to 32k carriers (using effectively up to 27,841 carriers across the frequency band) and Guard Intervals with a relative length from 1/128 to 1/4. In consequence this means that the Guard Interval can be as long as 532 microseconds (in an 8 MHz channel). DVB-T2 can be deployed in channels having bandwidths of 1.7MHz, 5MHz, 6MHz, 7MHz, 8MHz and 10MHz.

Supporting the idea of a family of standards, DVB-T2 imports the Forward Error Correction (FEC) first used in DVB-S2, namely Low-Density Parity Check (LDPC) coding. This state-of-the-art scheme is one of the reasons for the fact that DVB-S2 was adopted by the International Telecommunications Union (ITU) as the one and only second generation standard for digital satellite broadcasting.

A vast number of innovative ideas found their way into the DVB-T2 specification. For example, Physical Layer Pipes (PLP) are supported. PLP allow various services to be transmitted within one broadcast channel at different levels of robustness. HDTV programs targeting receivers connected to rooftop aerials can thus be carried together with SDTV programs receivable by portable or mobile receivers equipped with small and built-in antennas, and together with – say – radio programs that can be received under the most adverse conditions by pocket devices.

Like DVB-T, DVB-T2 allows the operation of Single Frequency Networks (SFN). In countries such as Germany, DVB-T networks cover large areas using just one frequency for all participating transmitters. SFNs automatically create “network gain” by replacing the destructive interference usually experienced in multi-transmitter environments with constructive interference: the signals

of various transmitters contribute positively to the received power at the reception point. In SFNs the individual transmitters typically operate at ERPs of just 20kW. Making use of the longest available Guard Interval, nation-wide SFNs can be built. In this case signals contributing constructively to the power accumulated at the receiver antenna may have travelled distances from the various transmitters in the network which differ by as much as 170 km.

A radically new approach to SFNs is enabled by DVB-T2 using Multiple-Input-Single-Output (MISO) technology. MISO enhances the network gain in an SFN beyond that possible with DVB-T. In contrast to MIMO (Multiple-Input-Multiple-Output) systems only one receiver antenna is used. The use of just one antenna was a commercial requirement which takes into account existing antenna installations in today’s private homes – specifically the number of antenna cables installed.

It is simply impossible to present in this short text all the innovations that have been introduced in DVB-T2 (time slicing, rotated and delayed constellations, multiple pilot structures, future extension frames etc.).

Will DVB-T2 ever be enhanced in the future? Possibly not - it has reached theoretical performance limits and is able to provide services to stationary, portable, and mobile receivers. The most robust mode available requires about 1 dB of C/N to provide perfect reception. The maximum data rate made possible by DVB in one 8 MHz channel is 50 Mbit/s. Well, the use of true MIMO technology is an enhancement that we may consider for some future update.

And how does the performance of DVB-T2 compare with that of DVB-T? Let us use the German DVB-T network as an example. An introduction of DVB-T2 in Germany would result in an increase of the data rate available per channel by some 50 % - without having to invest in more or more powerful transmitters and without jeopardising the reception quality (portable reception indoor and outdoor, mobile reception in cars, stationary reception) currently experienced in the country.

The DVB-T2 specification is available now. It will become an official ETSI (European Telecommunications Standards Institute) standard later this year. First live demonstrations of DVB-T2 will be shown at the International Broadcasting Convention (IBC) in Amsterdam, The Netherlands, in September 2008. It is expected that DVB-T2 will first be introduced in the UK from 2010, with many other countries following later.

IEEE GOLD

The IEEE operates the GOLD (graduates of the last decade) program to encourage participation by, obviously, engineers who have graduated in the last decade. We are pleased to announce the appointment of Teodor Buburuzan as our society's liaison.

Teodor graduated in June 2004 from the "Al. I. Cuza" University of Iasi, Romania with a degree in Computer Science. Since February 2005 he has been a member of the research staff at the "Institut für Nachrichtentechnik" (Institute for Communications Technology), Technical University Braunschweig, Germany. Here he has worked in several European Union sponsored research project in the areas of beyond 3G and heterogeneous wireless net-



works (DAIDALOS and DAIDALOS-2 Projects). He has also been working on his PhD Thesis.

He says, "I am relative new to the IEEE GOLD program, but from what I've seen until now it seems to be the perfect place for young engineers to interact and network with other professionals. Different online seminars and workshops are offered to GOLD members in order to help them keep track with the latest technical developments and help them develop both their technical and soft skills."

Besides serving our Society as GOLD liaison, Teodor is our web master. He can be reached at buburuzan@ifn.ing.tu-bs.de.

Storing Your Life

Thomas Coughlin

Data storage has become a major topic in consumer electronics in recent years. The demand for storage keeps increasing at an incredible rate – just ask your editor, who has to add storage to his home network every few months, it seems. And that's not counting the many devices coming into his home with their own storage capability – we have absolutely no idea how much storage exists in our home. The monster hard drive we installed for backup just a few years ago is coming up for replacement because it is just too small. It was state-of-the-art when we bought it, but you can't buy one that small any more. IEEE Consumer Electronics Society Distinguished Lecturer Thomas Coughlin has presented a lecture on the topic to over 250 engineers in Singapore, Hong Kong, St. Petersburg, the UK and Ireland this year. We present selected edited slides from this talk for the benefit of the entire Society membership.

Distinguished lecturer speaking engagement arrangements are made by the benefiting organization directly



with the Distinguished Lecturer. Scheduling and minimum audience sizes are at the discretion of the Lecturer. Distinguished Lecturer Engagements are subsidized. Each Distinguished Lecturer may present a maximum of six subsidized or shared-expense talks each year.

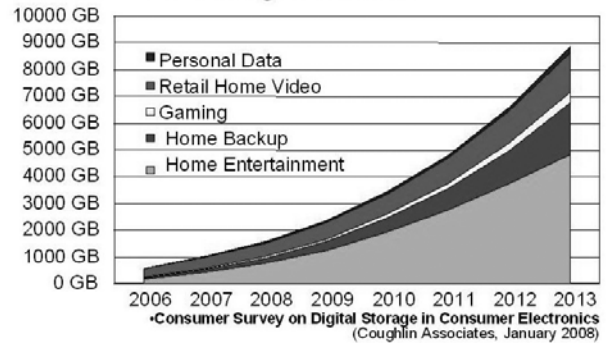
The following slides summarize Tom's talk.

Media Units vs. Storage Capacity for Various Resolution Photos, Music, and Video Files

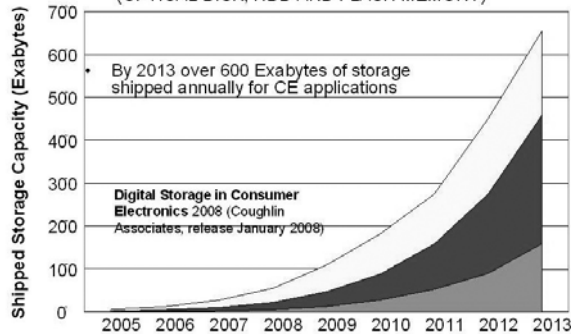
Here is storage required for various applications at various resolutions:

- A 4-megapixel photo viewer with 20,000 images needs 20 GB, 8-megapixel needs 40 GB
- A 10,000 song MP3 player needs 40 GB, HiD (e.g. compressed DVD audio) needs 1.5 TB
- A 100 movie player at VGA resolution needs 70 GB, at DVD resolution need >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

Accumulated Digital Content Per Average Household



Annual Exabytes Shipped for Consumer Electronic Storage (OPTICAL DISK, HDD AND FLASH MEMORY)



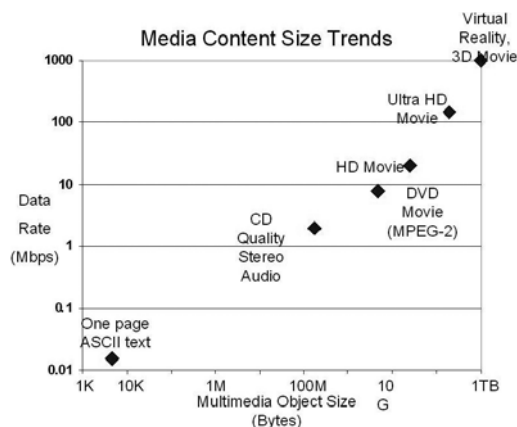
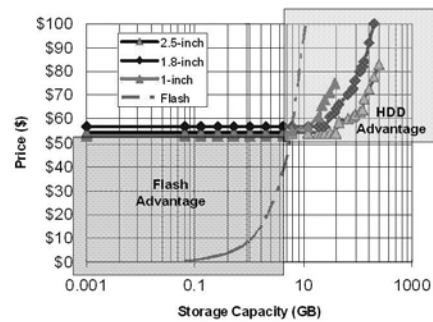
More synergy than competition between flash and HDDs

- Most of flash memory used in CE applications where content is first downloaded to HDDs and then "temporary" copy loaded on flash memory for playout
- Many flash memory applications such as digital cameras usually reuse the flash memory, downloading the captured content to HDDs
- Both commercial and personal content (such as photographs) are often backed up requiring even more HDD content
- Thus most CE applications help grow both flash and hard disk drive capacities and volumes

Flash and Hard Disk Drives

- Flash
 - Digital still cameras
 - MP3 players (very compressed content fits into needed capacity point for lowest price)
 - Other cache storage applications
 - Laptop computers where ruggedness is premium and storage capacity is limited
 - Low cost laptop computers—one computer per child
 - Removable computer storage (such as USB drives)
 - Competition to DRAM-based SSDs, possibly some SCSI/FC drives
- HDDs
 - Rich media players (Personal Video Players)
 - Rich media mobile devices (could be wireless access of a local NAS device)
 - Life-logs or other high resolution continuous capture devices
 - All applications requiring high resolution content such as higher quality music and higher resolution video
 - Majority of computer mass storage
 - Long term storage applications such as content delivery and backup

Comparison of price and storage capacity of flash memory and hard disk drives in mid-2007



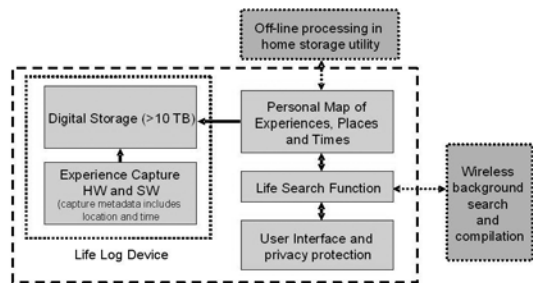
Metadata

- Metadata--information about a file or data object that allows easier search and use of the content
- Currently most metadata is entered manually
- Automated generation of metadata using content robots and sensors
 - such as automated GPS location recording on pictures and video
 - speech recognition and translation to text
 - image and video recognition and recording of the indexing information
 - Metadata into everyday life
- With inexpensive storage, metadata could become unlimited,
 - making the original content easier to find and use
 - enabling enormous capability to create single frame content analysis
 - also cross-correlation information between frames or even between many types of content and across multiple files
 - Enables analyzing the use of content by an individual to create unique tailored metadata

Life Log 2008 (shown at 2008 CES)

- A wearable personal video recording device was shown at CES
- This device only has 4 GB of flash memory at present
- This device “wants” a high capacity hard drive so it can capture higher resolution content
- Plenty of room for evolution of these types of products
- Such personal life recording could drive home storage requirements well beyond today’s needs.

Block diagram of personal memory assistant (includes continuous recording of a person’s life) showing major component functions



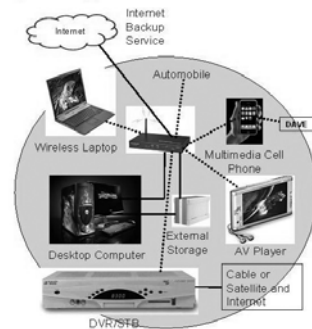
Such a device could require 10 TB of storage capacity on-board!

Rules for Storage Design

- 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—a hybrid is often more capable than a device with a single memory technology.
- Protect the customer’s content and battery life.
- Give consumers a way to protect their personal content and privacy—encryption and backup.
- 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.

Typical Home in 2017 (Home Storage Utility)

- Things won’t look like they do now
- Everything will be connected
- Content and storage will be shared and there will be many copies—storage is cheap and capacities are large
- Content is managed, indexed and automatically backed up



Home storage utility—home storage virtualization

- The home storage utility should provide the following basic functions:
- content backup and de-duplication in the home
 - content backup outside the home (to provide home disaster recovery)
 - content sharing in and around the home with optimal use of network resources
 - indexing and organizing home content
 - synchronization of content as needed
 - Automatic management and control of storage and network resources
- Virtualization or aggregation of physical resources can be done at many different levels
- At the host device
 - Within the network
 - Through an interaction between individual storage devices

Conclusions

- The demand for storage for CE applications is very elastic—if they have more storage they will use it!
- The modern storage hierarchy is more complex than in the past and includes more storage options depending upon performance and storage economics.
- Digital storage enables new applications for mobile and home devices that should make managing, organizing, preserving and using content easier.
- With the growth in personal content and content sharing through social networking the growth of digital storage for consumer applications is virtually unlimited.
- Managing, organizing and protecting home content will lead to new concepts applied to virtualize and aggregate digital storage in the home.

LETTER TO THE EDITOR

Jim,

Just got the Spring newsletter and read with interest. Thanks for the good work you do.

I would like to offer a comment to you about the use of the term “RMS power.”

As you may very well know, but, like so many in our profession have condescended to use the term anyway due to its popularity by those unknowing pseudo intellectuals who have just enough learning to be dangerous, there is no such term as RMS power. It is a misnomer.

The product of RMS voltage times RMS current does

not yield RMS power, but average power or just power. A true reading power meter is one that multiplies the true RMS voltage or current waveforms and computes the average power accordingly.

Most common users of this term, RMS power, are, unfortunately, and to my shame since I am a long time participant of this space of the consumer electronics field, those who characterize the power output of audio frequency amplifiers! But it is commonly used in other fields as well.

So, let me just point this out quietly so as not to pro-

long and perpetuate among our young readers this mythical power term and set the record straight for the sake of purity of our profession! Thanks for listening.

Here are some discussion sites about this:
http://en.wikipedia.org/wiki/Audio_power
http://www.eznec.com/Amateur/RMS_Power.pdf
<http://books.google.com/books?id=rroNzLIUO28C&pg=PA30&dq=RMS+voltage+times+RMS+current+gives+power&sig=6J2Br8fopUZ5NhHa5zUe96Xe8OY#PPA30,M1>

Any high school or college text book on basic electrical circuits will offer an explanation of the purpose of using the RMS value of repetitive voltage and current waveforms. In fact, the whole purpose of computing the RMS value in the first place is to be able to compute the power.

Almon H. Clegg,
Life Senior Member

And the editor responds,

Alright Almon, I'm guilty as charged. In the last issue I made reference to being probably the only nerd on the planet who has asked for a true RMS wattmeter as a Christmas present, because I wanted to do some scientific studies of where I was wasting how much energy. Of course, Almon is correct that, by definition, you don't talk about RMS power. RMS, or root mean square, is the technique for describing a voltage or current of arbitrary waveform, as one having the same ability to heat a resistor as does the same amount of direct current. I got sloppy in my use of the technical terms, and there is no excuse for an engineer doing that.

We all have terms that other engineers use that make us cringe for one reason or another. One of the smartest engineers I've ever had the pleasure of working with is Dr. John Kenny. He's a rare engineer in that he knows the technology in the greatest detail, but he also writes exceedingly well. If I am going to have him proof something I wrote, I'd better not talk about energy in quantifying the amount of a signal moving from one place to another: I'd better talk about power, the time derivative of energy, or John will slap my hand for sure.

To this day I cannot write that current flows someplace. My thesis advisor way back in the stone ages, when we did our formal writing on IBM Selectric typewriters, made me re-write my thesis to remove references to current flowing. His logic was that current was defined as a flow of charge, so if

you talked about current flowing, you were being redundant: the charge is flowing is flowing.

Early in my career we had a very senior engineer who would not let us refer to "printed circuit boards." His logic was that the laminated board with copper traces was not the complete circuit, so when we referred to the laminated board we had to call it a "printed wiring board. To this day it is hard for me to use the term "printed circuit board."

That's one of many things I like about engineering, though: we have a very precise language designed to efficiently communicate concepts to our fellow engineers. The whole idea is accurate, concise, understandable communications. This is refreshingly different from what, for instance, lawyers do. In my job, I spend a lot of time with lawyers, especially patent lawyers. They say that their language is intended to be very precise, but I cannot tell you how many times we have spent hours debating the meaning of some phrase in a patent, whereas had an engineer written it, the meaning would have been obvious. (Oh, just coincidentally the lawyer was making a lot of money per hour while we were debating the meaning.) At least that's true had the phrase been written by the rare engineer who could communicate well. I once flew across the country to interview an inventor who had some technology we were considering licensing. One of my first questions to him was to ask him to tell me, engineer-to-engineer, just what he was trying to protect with his patent, which I had read but didn't understand very well. Honest, his answer was, "My lawyer wrote that and I don't know what he had in mind."

Oh, Almon, I do disagree with one thing you said: you cannot measure the RMS voltage and RMS current then multiply them to get the power consumption. There can always be a phase difference between the voltage and the current, so that the real power is less than the power measured from the RMS voltage and current. Also, I'm not sure how many modern power supplies pull power during only part of the cycle of the alternating current mains supply. A long time ago, before I had a variable temperature soldering iron, I rigged a switch on my workbench that, when I turned it to the standby position, a diode was switched in series with the soldering iron. That way current only existed (note that it didn't "flow") during alternate half cycles of the voltage waveform. Lamp dimmers work by conducting current only over a pre-determined percentage of the power waveform. Could be a bit tricky computing the power drain under those conditions, though I suppose a true RMS power meter might get it right.

USERS' BEHAVIOR TOWARD M-ADVERTISING

An Exploratory Study of the Role of Perceived Intrusiveness and Ad-Clutter

Prof. Claire Gauzente, claire.gauzente@univ-angers.fr

GRANEM UMR MA 49, University of Angers, 13 allée F. Mitterrand, 49000 ANGERS, France and SBS – Southampton Business School, UK

(Much of the cost of consumer interaction with electronic devices is ultimately paid for through advertising. This makes consumer reaction to advertising of interest to consumer electronics engineers – a good bit of our work in the end is either paid for or subsidized by advertising. This academic paper investigates the reaction of young consumers to a new form of advertising – mobile advertising, or m-advertising on cell phones. –ed.)

Introduction

Up to 90 percent of the world's six billion people will have mobile telephone coverage by 2010 an industry study has said (<http://www.textually.org/textually/archives/2006/10/013841.htm>).

This is one of the reasons why mobile marketing has a great appeal to marketers. Indeed, fixed line connections are increasingly being substituted by mobile connections and surveys show that the mobile only segment – that is the share of people accessible only via their mobile phone – is increasing and is now up to 35% of the population. For marketers, this means a different type of medium for contacting customers compared to fixed lines and also the only medium through which certain segments are contactable. The mobile channel is part of a multi-channel approach to customer relationship management; it allows for a more varied playful interactive and reactive type of consumer contact.

In addition, research suggests that mobile marketing is cost-effective thanks to permission marketing (consumers a priori agreed for this type of solicitation); response rates to mobile campaign are often in the region of 10 to 20% and viral effects accelerate its role. For instance 89% of Internet users share news and jokes in the USA. Viral marketing takes advantage of the very fast way in which messages can be multiplied through a mobile network of individuals.

One of the main tools of mobile marketing is text messaging, or SMS (short message service). This tool seems to be particularly appreciated by younger people. Although there are good reasons for considering mobile and SMS channels as a powerful vehicle for a marketing campaign, consumer acceptance and response still needs investigation.

In particular, in a context of increased skepticism toward advertising, whatever the form, evaluating consumer's response is priority. The present study aims at assessing the link between consumers' usual behavior when receiving m-ads and potential antecedent variables such as attitude toward m-advertising, perceived intru-

siveness of m-advertising and perceived ad-clutter.

The research field focuses on young consumers, as they represent the biggest segment and should be carefully studied.

The paper is organized around two main sections. First, the rise of skepticism in attitudes toward advertising is discussed. Second, results of our exploratory study are presented and discussed.

1. Attitude toward advertising and the rise of ad skepticism

Attitude toward advertising-in-general (Aag) is defined as "the audience member's affective reaction to advertising in general." Many of the seminal studies dedicated to examining attitude toward advertising-in-general were conducted in the 1950s and in the main were conducted by institutes such as Gallup or Harris & Associate.

Researchers have shown that Aag is transferring automatically to attitude toward a specific advertisement (Aad) and that Aad is a powerful predictor of advertising effects. Based on this, a first question emerges.

Question 1: *Can the attitude toward m-advertising be assessed and how do people evaluate it?*

Over time, attitudes of the public towards advertising have shifted from being initially favorable to one of greater ambivalence, and even to genuine suspicion. The rise of generalized skepticism toward advertisements has at this point become a deeply rooted trend of modern society. Researchers have defined skepticism as "the tendency to disbelieve the informational claims of advertising." They show that skeptical consumers tend to search for other information sources in order to make their choices. In addition to this, ad clutter and intrusiveness has been shown to nurture avoidance behaviors. For advertisers as well as for media planners, the negative consequences of avoidance behaviors are clear: it results in diminished credibility and a shrinking consumer market.

Therefore, we raise the following questions:

Question 2: *Does perceived intrusiveness significantly impact behaviors?*

Question 3: *Does perceived ad-clutter significantly impact behaviors?*

2. Preliminary results

A convenience sample composed of 93 young adults is used in this study. There are aged between 19 to 25 years, 87% are university students, the rest are college students. They possess a cell phone for an average num-

ber of year of 5.239 (dev: 2.062), and spend 27.59 minutes daily on their mobile phone. The sample split is 45 males and 48 females.

According to the results of exploratory factor analysis, perceived intrusiveness is a one-dimensional construct; the first factor is then used in subsequent analyses. Scores have been calculated for attitude toward m-advertising and perceived ad-clutter.

A cluster analysis helps to identify three meaningful groups. The first one (n=31, ie: 33% of the sample) represents people whose behaviors are mainly acceptance behaviors (they read or at least browse messages), we name them "consenting group." The second group (n=20, 21,5%) corresponds to people rejecting m-ads (they delete sms-ads directly or open them in order to delete it), they are named "rejecting group." The last group (n=42, 45% of the sample) is more ambivalent (they open a message and either delete or browse it before deleting it), they are designated through the "ambiguous group" term.

Table 1 shows the relationships among attitude toward m-advertising, perceived intrusiveness and perceived ad-clutter. It indicates that perceived ad-clutter and perceived intrusiveness are strongly linked, which is not surprising given the proximity of the concepts. It also indicates that when attitude toward m-advertising is favorable, perceived intrusiveness and perceived ad-clutter are reduced.

Table 1. Relationship among attitude toward m-advertising, perceived ad-clutter and perceived intrusiveness

		Attitude	Perceived intrusiveness
Perceived intrusiveness	Pearson Corr.	-.522(**)	
	Sig.	.000	
Perceived ad clutter	Pearson Corr.	-.680(**)	.680(**)
	Sig.	.000	.000

A one-way ANOVA was conducted in order to explore the differences between our three behavioral groups concerning their attitude and perceptions (see table 2).

Table 2. Usual behavior, attitude, ad clutter, and intrusiveness

		N	Mean	Sign.
Perceived intrusiveness	Consenting gr.	31	-.2079949	.059
	Rejecting gr.	20	.4524762	
	Ambiguous gr.	42	-.0619448	
	Total	93	.0000000	
Attitude toward m-advertising	Consenting gr.	31	-.8710	.000
	Rejecting gr.	20	-4.6000	
	Ambiguous gr.	42	-2.7143	
	Total	93	-2.5054	
Perceived clutter	Consenting gr.	31	8.1290	.006
	Rejecting gr.	20	10.4500	
	Ambiguous gr.	41	9.0976	
	Total	92	9.0652	

The results indicated that attitude toward m-advertising, perceived ad-clutter and, to a lesser extent, perceived intrusiveness are significantly different from one group to another. Reluctant people hold negative attitudes toward m-advertising, feel it to be highly intrusive and feel overwhelmed by m-advertisements. While perceived intrusiveness is only significant at a 10% level (which is a loose criteria), it can be suggested that it plays an indirect role in behaviors. This obviously needs further research.

All in all, it appear clearly that attitude toward m-advertising has an impact on acceptance/avoidance behaviors. Perceived ad-clutter also helps to understand avoidance behaviors. The role of perceived intrusiveness is less clear although we can suspect it to influence behaviors. We also observe that 50% of the participants hold relatively negative attitude toward m-advertising (median is at 2 out of 5). In addition, neither length of possession nor daily use make any difference between the three behavioral groups. Nevertheless, it appears that women are significantly more likely to adopt accepting behaviors, as they represent 71% of the consenting group.

Conclusion

The aim of this study was to assess the role of attitude toward m-ads, perceived intrusiveness and ad-clutter on behaviors toward sms-advertising. Results show that these concepts are relevant and yields interesting results. The most predictive variables are attitude and perceived ad-clutter. And women tend to accept more easily m-ads.

Although rejecting consumers represent only 22% of the sample, the overall attitude toward sms-advertising is negative (50%). It clearly constitutes a warning to practitioners. Even when preliminary consent has been obtained (following the golden rules of permission marketing), this is not an insurance of being accepted and read. Clearly there is a need for further research. This study only yields preliminary results on a convenience sample. It should be expanded on a large-scale sample in order to assess more thoroughly the proportion of each behavioral group in the population and in order to identify their characteristics so that adaptive practices can be developed and implemented.



Original research : C. Gauzente (2008), Attitude toward M-Advertising, Perceived Intrusiveness, Perceived Ad-Clutter and Behavioral Consequences: A Preliminary Study, Computer-User Behavior, DEXA Conference; Turin, Italy (September).

Bio : Dr. Claire Gauzente is a Professor of Marketing at the University of Angers – France. Her research focuses on the impact of IT on marketing practices and its ethical aspects.

2-IN-1 USB/ESATA INTERFACES STEAL THE SHOW AT COMPUTEX

Tom Coughlin
Coughlin Associates
www.tomcoughlin.com

USB devices have become ubiquitous. Thumb or flash drives seem to proliferate like mice in a cheese plant. Everyone is giving these things away, often with catalogs or other company information on them. These devices have become the de-facto way to transfer files and data from one electronic device to another. Likewise for backup and other higher capacity storage applications external hard disk drives with the USB interface are very common. USB interfaces are found on almost all commercial and consumer electronic devices in the market. The current USB 2.0 interface provides data rates up to 480 Mbps.

eSATA is an external version of the SATA interface that is used in desktop and laptop computers as well as in many consumer devices and an increasing number of disk drive storage arrays. The eSATA interface provides data rates up to 3,000 Mbps (3 Gbps), roughly 6 times faster than the USB 2.0 interface (actual data rate differences are different due to the overhead used in each interface standard, as well as the peculiarities of the particular application). The high data rates of the eSATA interface provide an ideal interface for video editing,

backup and other data-intensive applications where the a slower interface speed would limit the performance of the user experience. A faster data rate allows high resolution video frames to be streamed off the external storage device without interruption.

The eSATA interface has such a high data rate that several streams of content can be handled at once across the interface (the number of streams depends upon the resolution and compression of the content). For this reason most new Digital Video Recorder (DVR)-capable set top boxes used in cable and satellite TV as well as stand alone DVRs now include an eSATA port that can be used to expand the internal storage capacity of the DVR device.

USB 3.0 has been announced for implementation in the next several years with a data rate of about 5 Gbps. It will be a new interface with backward compatibility to the existing USB 2.0 connectors. The next generation eSATA would provide 6 Gbps data rates and will probably be available before USB 3.0 connectors. Such high speed interfaces can provide even greater capability to handle rich content and multiple stream content.

The eSATA port required special connectors to implement. This added to the cost of implementation and has limited the number of devices that provide this very fast interface. There is a recent rash of devices using the so-called 2-in-1 connectors that support both USB 2.0 and the current generation of eSATA. Although not an official standard interface, this hybrid connector (available from Tyco, Taiwin and FCI) allows a low cost, space saving capability that gives users the choice of ubiquitous USB or blazingly fast eSATA external storage devices. At the recent Computex conference in Taiwan there were a plethora of laptops and other popular consumer devices sporting these hybrid connectors.

The 2-in-1 USB/eSATA connector looks to be a hit in the computer industry and I expect these combination interfaces to proliferate. The growth of these connectors supporting both USB and eSATA will also help the external eSATA interface get more traction in a broader market. This will help to drive the adoption of eSATA and promote growth of companies that support eSATA, including Silicon Image, Marvell, Oxford Semiconductor and Intel.

STUDENT CHAPTER PROMOTION STATUS REPORT

Steve Chao

- A student chapter that consisted of several 10's of NCTU students was organized by IEEE CES Taipei Chapter on May 14th, 2008
 - Two follow-up planning meetings were further organized
- Chuan-Yau Chan, senior Electronics Engineering Department, assumed President with Mandy Tang, secretary, and Hsi-Yuan Huang, treasurer
- 3 mentors
 - Professor Steve Chao, industry relationship mentor
 - Professor TiHao Chiang, Taipei Chapter Chair
 - Professor Winston Fang, seminar mentor
- An annual president-elect succeeding mechanism was discussed and agreed upon
- It plans to hold 4 industry visits each year
- It will promote ICCE, ISCE partici-

- pation later on
- Budget: membership fees, Taipei Chapter support
 - IEEE CES NCTU Student Chapter, 2008 Planning Meeting
 - NCTU Bookstore Cafe, June 22nd, 2008

Attendance :

- CES NCTU Students Chapter, board members
 - Chuan-Yau Chan, President
 - Chun-Man Tang, Secretary
 - Hsi-Yuan Huang, Treasure
 - Hsin-Wu Hsi
- Taipei Chapter Chair: Professor

- Chiang TiHao
- IEEE CES ADCOM Students Chapter Promotion: Steve Chao
 - Governor IEEE Circuits and Systems Society :Winston Fung

Agenda :

- 2008 chapter board members confirmation, and mentors
- organization succeeding mechanism
 - chapter administration events
 - 2008H2~2009H1
 - 2008 H2 beginning, member invitation
 - 2008 H2 end, board elect and practices in 2009 H1 beginning

- 2009 H1 end, board succeeding
- chapter budget source
 - income sources :
 - Membership Fee :300~500NTD per semester
 - IEEE CE Taipei Chapter
- schedule plan
 - mentor supported industry practice visits: 4 times/year
 - Corning Glass°BHTC°BGoogle°B D-link°BChiMei°BTI°B ZyXEL
 - 1st date: 9/26/08(fri)
 - conference ICCE and ISCE
 - ICCE Jan 2009, Las Vegas
 - ISCE xx 2009, xx xx

SENIOR MEMBER UPGRADES

Congratulations to the following individuals who have qualified for Senior Member grade since our last Newsletter.

Yuxin Chen, Toronto Section
 Tom Cumberland, Toronto Section
 Saraju Mohanty, Fort Worth Section

If we have omitted anyone, we apologize and ask you to send your name to jofarmer@mindpspring.com. We'll include you in the next issue. Senior membership is the highest grade of membership for which you can apply on your own behalf. To apply, go to www.ieee.org and follow the links under *membership* then *managing your membership*, or go directly to <http://www.ieee.org/organizations/rab/md/smelev.htm>.

EXPERT NOW

We are excited to report that IEEE Expert Now continues to steadily move forward with progress being made everyday. IEEE Expert Now is an exciting educational program in which leading experts recognized in their fields work with us to develop professionally produced, quality reviewed online courses that are accessible to customers world-wide 24 hours a day, 7 days a week. Courses are delivered via an easy-to-use player-viewer that includes audio and video files, diagrams, animations, and course notes that users can download or print. Upon successful completion of each course, IEEE CEUs are available for

use in maintaining professional licensure.

In 2007, individual IEEE Expert Now courses became available for purchase by IEEE Members within IEEE Xplore. In addition, the IEEE Sales & Marketing Team also continues to make progress in their efforts to obtain new institutional subscriptions to the entire collection of IEEE Expert Now courses. The program also experienced an increase in participation from the IEEE Technical Societies in this past year and we look forward to continuing our collaborations in 2008.

To date, the IEEE Expert Now collection includes 69 titles with an addi-

tional 32 currently in development, and new courses being added on a monthly basis. You can view the listing of modules by subject area by visiting <http://ieeexplore.ieee.org/modules/modulebrowse.jsp>. As previously mentioned these individual courses are now available for IEEE Members to purchase within Xplore and are reasonably priced at \$69.95 per module for 30 days access.

We are sure that you will continue to find IEEE Expert Now to be a worthwhile investment and beneficial to your membership needs for continuing professional education. Thank you again for your continued support of this program.

CHAPTER NEWS

Stefan Mozar

Currently three CE Society Chapters are being formed. Members interested in supporting the start up of these chapters can contact Stefan Mozar (s.mozar@ieee.org). Each of the three chapters requires the support of local members to get the chapters started. The Chapters are in

- Italy
- Malaysia
- Australia (NSW)

These chapters need the signa-

tures of 12 supporters. Please contact Stefan Mozar if you are willing to support the chapter start up by signing the chapter petition, or if you are willing to serve on the Chapter committee.

If there is no local CE Chapter in your area, and if you are willing to help get a chapter started, please contact Stefan Mozar for assistance in getting the chapter started.

A new CE Chapter has been formed

in Japan, called the CE Kansai Chapter. The chapter Chair is Prof. Hase, who is also the Chair of the 2009 International Symposium on Consumer Electronics (ISCE-2009). The ISCE will be held in Kyoto between the 25 and 28 May 2009. The call for paper is available at www.isce2009.ryukoku.ac.jp. Anybody wishing to get involved in the chapter may contact Prof. Hase (hase@rins.ryukoku.ac.jp) or Stefan Mozar (s.mozar@ieee.org).

ADCOM ELECTION

Dear CE Society members,

This year we are trying out our first web based election of members for the Administrative Committee (Adcom). By going to a web based voting system, we hope to increase the number of members who will vote. For a society of the size of the CE Society, web based voting is substantially more expensive than is the paper ballot. The web based election is being used this year in order to provide members an easier way to

submit their votes.

This year we have nine candidates that are standing for five positions. In the past the election has been by paper ballot. Historically participation in the paper ballot has been very poor. Only 6 to 7% of CE Society members have voted in the past, and the majority of the votes come from the USA. The USA accounts for about 60% of CE Society members, the other 40% are from the rest of the world. I urge every-

body to cast their vote. It will only take a few minutes to log on and submit your votes.

After the election we will report in the Newsletter about the participation in the elections. If you would have any question or comments about your preferences and or experience with the election process please e-mail these to me at s.mozar@ieee.org.

Stefan Mozar
Nominations Chair

FROM THE EDITOR

James O. "Jim" Farmer
Wave7 Optics, An Enablence Technologies Company
jofarmer@mindspring.com

Hey, it's me sticking myself in the back of the Newsletter this time. As you can see, we had an embarrassment of riches in the material we got for the Newsletter this time, so I got bounced to just a few lines at the end. There were several great articles and regular features we are having to bounce to the fall issue because we have this messy thing called a page budget that we have to respect. My apologies to the Transactions and the CEA for not having space this time –

will make up for it in November.

One of the articles we didn't have room for was about cool new consumer electronic devices that are emerging. Several of the folks in leadership positions in the Society got into a great email discussion on that idea, and we really wanted to get in an article, then get your reactions. The realities of time to distill the material, and space have made us postpone the piece. But why don't you go ahead and start send-

ing me your ideas, and it'll make the piece better when we do have space to publish it, hopefully in the fall.

We have some new associate editors who are already making the Newsletter better. I'd like nothing better than to have to go to the AdCom and ask for a bigger page budget because we consistently have so much good material! Keep it coming, all of you. Anyone can contribute – just send me word and .jpg files.



ICCE 2009



Mark Your Calendar!

27th International Conference on Consumer Electronics

January 10-14, 2009, Las Vegas, NV, USA 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



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