

Instrumentation & Measurement Magazine

February 2008

Systems and System of Systems

I & M Society Web Site Submission

Complete Columns

From the Editor's Bench by Kim Fowler

Systems Engineering: Clear Thinking, Shipping Air, and Solar Energy Isn't Free

This issue focuses on several specific topics in systems engineering. A major aspect for the systems engineering of a project is to know the end-goal and to understand how the development activities within the project fit into the bigger picture to reach the end-goal. Anyone preparing the development of a project by doing the systems engineering must understand the ramifications of each stage. Figuring out those ramifications can be mind-boggling, complex and absolutely requires clear, careful and thorough thinking.

Someone recently related to me how systems engineering and clear thinking produced a solution for reducing casualties among military personnel from detonated improvised explosive devices (IEDs). The team analyzed the problem by first asking what type of traffic, targeted by IEDs, traveled the roads of Iraq. They next asked how much of each type traveled those roads – they found out that a disproportionate number of vehicles were tanker trucks with fuel oil. Continuing to “pull on the loose end of the ball of string” to understand the root causes they then asked what used so much fuel oil – the answer was military cooking stoves! Still not quite satisfied that they had something to change or fix or solve, they researched the cooking stoves and found that the standard issue was quite inefficient; so they proposed redesigning the cooking stoves to be more efficient and use less oil. OK – now follow the “string” of thought back out – less oil would mean few deliveries of fuel oil; fewer deliveries of oil would mean few trips by tanker trucks; fewer convoys of tanker trucks would reduce the exposure of military personnel to IEDs; reduced exposure should reduce casualties. Clear thinking in systems engineering considering the ramifications produced that unique solution.

Another way towards clear thinking for a project is to make the business case. We engineers and scientist tend to focus on specific technology solutions; we can sometimes get tunnel vision and

miss the bigger picture. Making the business case for a project is one way that we can find and understand other ramifications and consequences in a project.

Recently, I spoke with a marketing manager for a highly technical product used in materials handling. His comment was that innovation to his products did not happen until two things happened simultaneously: functionality had to increase while cost had to decrease. Having just one of those criterion go in the right direction was not sufficient; increasing functionality without decreasing cost or decreasing cost without increasing functionality just were not enough. The technical portion had to have a business case that made sense to the company before it would be instituted.

I have a good friend who just entered the solar energy arena. It is a funny and somewhat backward field that has lots of technical lore with oft quoted statistics that do not hold up to scrutiny in the “light of day.” I marvel each time we talk and I hear him discuss and then debunk another long-held “truth” in solar energy. He is a prime example of someone who exercises clear thinking with a big-picture perspective that considers the ramifications and consequences. Here are some of the things that he has encountered:

- Solar energy is free! Well, hmm . . . no it’s not. Solar collectors are capital assets that cost money to purchase; then they have to be maintained (really?! yes, dust collects on them and cuts down the efficiency of capturing solar radiation. Someone has to clean the collectors.); solar collectors can only go in certain geographical regions, which require large capital expenditures in transmission capabilities to get the energy where it is needed; solar energy does not provide power on demand, so more capital assets are needed if you want to store energy (choose your favorite method) and then discharge the stored energy.
- Solar energy has an environmental impact. Solar collectors shade the ground and any vegetation on it – this means that the environment is affected. Now you have to perform environmental impact studies, even in desert areas, which mean that the environment is affected.
- He even had one colleague suggest placing arrays under power lines because the land is already cleared and typically has vehicular access. Well, hmm . . . nice idea until you consider the ramifications. Power lines have a minimum clearance to the ground of 20 feet (about 6 meters) and transmission companies already use the minimum clearance to keep transmission towers from being taller (and more expensive) than necessary.
- He is working on a project where the team is considering installing units of concentrators integrated with photovoltaic cells to increase efficiency. Well, hmm . . . nice ideas until you consider the consequences. First, you need a lot of units of integrated concentrators and photovoltaic cells to build a reasonable sized generating plant. (Now follow the string on the ball of thread here . . .) Integrated units of concentrators with photovoltaic cells have considerable volume for the energy produced, much greater volume than lower-efficiency flat panel collectors; this means that basically when you transport the units from the factory to the site, you are shipping a lot of air (come on, stick with me here, there is air filling the large spaces within each unit). Basically you are paying to ship air . . . most likely with diesel fuel . . . which is one of the things you hoped to avoid with solar energy . . .
- Wind energy is free! Well, hmm . . . no for the same reasons in the first bullet.

These are just some of the basic things my friend has encountered that others have not thought completely through to logical conclusions. He has encountered a lack of clear thinking about the big picture.

Another area my friend has talked about is the potential for a hydrogen economy – nice idea to reduce pollution except how do you produce it? While fuel cells that use hydrogen in applications tout efficiency and acceptable combustion byproducts, the front end process requires energy to produce the hydrogen, so in the end are we really more efficient? See the big picture; is the total end-to-end efficiency any better than the current fossil fuel economy? Maybe we could use windmills to produce hydrogen – now we are back to the problem of large capital expenses to acquire infrastructure: buying, building, and installing the windmills, maintaining them, collecting the hydrogen produced and shipping it to distribution points, storing hydrogen, and then dispensing it. All this requires clear thinking of the ramifications and consequences.

Ok, I have just raised a lot of questions. These questions represent just some of the sort of considerations about which we need to think clearly and to perform proper systems engineering.

Enjoy this issue of the magazine and the articles on systems. I trust it will stir up some of your thinking processes.

Kim

President's Perspectives

By Alessandro Ferrero

Knowledge for Knowledge

When I attended my first meeting of the I & M Society Administrative Committee (AdCom) many years ago, I never imagined that one day I could be elected President of the Society. Imagine my surprise when last October, during the Fall meeting of the AdCom in Stresa, Italy, I read my name on top of the list of the candidates for the officer's positions, with the word "President" aside. Then, the AdCom elected me. Stresa is the place where I spent many winter week-ends of my childhood and where, on the slope of the Mottarone Mountain that towers over Lake Maggiore, I learned to ski.

You can also easily imagine the turmoil of different and contrasting feelings: the joy for having been selected and the gratitude to the AdCom members that trusted me, but also the chilly shudder of fear of not being up to this task. Since I don't like to give up to fear, I started to ask myself what I could do, beyond the mere management of the current Society business, for this Society, its members, the I&M community and the development of the I&M field. The first answer that came to my mind was to share my outlook of our field of interest – Instrumentation and Measurement – with you. If we agree, we can combine our efforts to make this Society even better and more useful to its Members – present and potential. If we don't agree, we can start a fruitful discussion toward a larger consensus about what this Society should be and how it could better serve its Members.

There is no doubt that measurement activity permeates almost every moment of our life and that we are fairly good instruments ourselves, at least in a limited range of the input quantities. Consider a mother who, by caressing the forehead of her child, or posing her lips on her child's temple in a gentle kiss, measures her child's temperature quite accurately and with a sensitivity of about half a Celsius degree. Were Socrates among us, he would probably argue that this is only a sensation and is not adding knowledge to the idea we have of temperature. However, we live in a more modern scientific era, and Galileo showed us that measurements are the bridge between the abstract world of concepts and the empirical world of sensations: whenever we make a measurement, we get a quantitative evaluation of the quantity we're measuring, and hence we quantify a concept and we have a better knowledge about it. It's not by chance that we've quoted Lord Kelvin's "To measure is to know" in the right upper corner of our Society's web site!

Provided that we all agree – and I hope so – that measurement yields knowledge; can this be the final point in our investigation of the meaning of I & M? I don't think so. In my opinion, this is only the starting point, because good measurement results don't come for free. They require a much broader knowledge: we need to know how to build instruments, how to use them and how to evaluate how "good" the obtained measurement result is. Increasing and disseminating this knowledge is the way to extract better knowledge from the measurements we perform and should be, in my opinion, the main goal of our Society. For this reason, I dared to re-phrase Shakespeare's "Measure for Measure" – could I choose any other comedy? – into "Knowledge for Knowledge" for the title of my first column.

I don't know whether we'll ever achieve this goal but I know that we have the tools to work toward it. We have our publications – the TRANSACTIONS on Instrumentation and Measurement and this magazine – and we have the Conferences, Symposia and Workshops sponsored by the Society where new ideas can be discussed and refined. We have the synergetic expertise of our members who are active in instrument manufacturing, academia and National Metrology Institutes. They contribute to the development of knowledge in instrument design, measurement methods and measurement characterization. We have the expertise of members who practice measurement in their everyday working activity and are the most important sources of questions and solutions.

Again, this is not the finish line. The challenge for our Society, its AdCom and its President is to continue to steer this synergy toward making our Society a worldwide forum where people interact, exchange ideas, pose new problems and discuss possible solutions. The Instrumentation and Measurement Society will then become the recognized seed bed of knowledge in the field of I & M.

It is a true challenge, but I'm confident we will succeed with your help. In this issue of the Magazine, you'll find the list of the Society's officers. Please, contact us. Let us know whether you share these opinions or not. Let us know your suggestions, your comments and your points of dissatisfaction with the Society's actions. You're the feedback path. Don't leave it open. We're engineers, and we know that open control loops are not the best solution.

Membership Notes

by Ruth Dyer

New Chapters

We are very pleased to issue a warm welcome to three new chapters of the I&M Society! These chapters are the Estonia Section Joint Chapter (Electron Devices/I&M/Engineering in Medicine and Biology), Rio de Janeiro Section Joint Chapter (I&M/Controls), and the Republic of Macedonia Section Joint Chapter (Electron Devices/I&M/Solid-State Circuits). We are very excited to have them join our existing Chapters, and we look forward to working with them to provide benefits to our I&M members. We are always eager to establish new chapters, and anyone interested in working to establish an I&M Chapter in your Section, please contact the I&M Chapter Liaison, Jorge Daher (jdaher@adinet.com.uy). Again, welcome to the Estonia Section Joint Chapter, the Rio de Janeiro Section Joint Chapter, and the Republic of Macedonia Section Joint Chapter!

Ruth

Chapter Chairs, Sept. 2007:

Agashe, Sudhjr	headinst@vsnl.com	Bombay Section Chapter
Akmeliawati, Rini	rini.akmeliawati@eng.monash.edu.my	Malaysia Section Chapter
Aloe, Frank	frank.aloe@microchip.com	Toronto Section Chapter
Arsov, Goce L.	g.arsov@ieee.org	Rep. of Macedonia Section Joint Chapter
Bilas, Vedran	vedran.bilas@fer.hr	Croatia Section Chapter
Castelli, Marcelo	mcastelli@um.edu.uy	Uruguay Section Joint Chapter
Dewey, Michael	miked@geotestinc.com	Central New England Council Chapter
Dubovoy, Volodymyr	dub@faksu.vstu.vinnica.ua	Ukraine Section Chapter
Golovanov, Carmen	cgolov@electro.masuri.pub.ro	Romania Section Chapter
Groza, Voicu	groza@site.uottawa.ca	Ottawa Section Chapter
Hadjiski, Mincho	hadjiski@uctm.edu	Bulgaria Section Joint Chapter
Hinkle, Gary	gary@auxilium-inc.com	Oregon Section Chapter
Iverson, Kyle	iversonk56044@yahoo.com	Twin Cities Section Chapter
Jachowicz, Ryszard	rsjach@ise.pw.edu.pl	Poland Section Chapter
Jobbagy, A'Kos	jobbagy@mit.bme.hu	Hungary Section Joint Chapter
Joshi, S.	shri.joshi@marquette.edu	Milwaukee Section Joint Chapter
Kale, Izzet	izzet.kale@emu.edu.tr	UKRI Section Chapter
Kanoun, Olfa	kanoun@uni-kassel.de	Germany Section Chapter
Kyriazis, Gregory	gakyriazis@inmetro.gov.br	Rio de Janeiro Section Joint Chapter
Lalli, Vincent	vincent_r_lalli@yahoo.com	Cleveland Section Joint Chapter
Lee, Yeou-Song (Brian)	brian.lee@ieee.org	Santa Clara Valley Section Chapter
Martens, Olev	olev@mtel.ee	Estonia Section Joint Chapter
Noor, Norliza	norliza@citycampus.utm.my	Malaysia Section Joint Chapter
Petri, Dario	petri@dit.unitn.it	Italy Section Chapter
Proffitt, Scott	sproffitt@acstestlab.com	Atlanta Section Joint Chapter
Sachenko, Anatoly	as@tanet.edu.te.ua	Ukraine Section Joint Chapter

Shida, Katsunori
Silverman, Gordon
Singh, V.
Srinivas, T.K.

shida@cc.saga-u.ac.jp
Gordon.silverman@manhattan.edu
vrsingh@ieee.org
tk@ieee.org

Japan Council Chapter
New York Section Chapter
Delhi Section Chapter
New Jersey Coast Section Joint Chapter

IMS Hardware Design Competition

IEEE Instrumentation and Measurement Society (IMS) is pleased to sponsor a **Hardware Design Competition** at the Region-level, intended to be organized as part of Student Conferences/Congresses. Regions can apply for financial support up to **\$1,500** that may be used for awarding student prizes and/or purchasing supplies. In addition, competition winners will be provided with 1-year free student memberships in IMS and will be designated "Student Ambassadors." IMS plans on making awards to two (2) Regions each year, these regions will be selected based on the submission of a brief proposal that will be reviewed by the IMS Administrative Committee. For more information, please visit our website at: http://www.ieee-ims.org/members_student.htm.

Chapter Funding Program

The I&M Membership Committee encourages all of our chapters to consider submitting proposals for awards from the Chapter Development Funding Program. These awards were established to assist chapters in the development and implementation of events that enhance the value that chapters can bring to their members.

Guidelines, timelines, and the application form are provided on the I&M website, along with examples of events that were previously developed and funded through this program. The ideas and examples we have included are to stimulate your thinking, not to limit what you can do. We want to encourage you to be creative! For more information, please visit our website at: http://www.ieee-ims.org/members_chapter.htm.

AUTOTESTCON

AUTOTESTCON was held in Baltimore, Maryland on September 17 – 20 at the Baltimore Convention Center. It was one of the most successful AUTOTESTCON meetings in history, with 284 exhibition booths. The Technical Panel, chaired by John Sheppard, reviewed 141 papers, accepting 100. Of those 100 papers, 9 were graduate student papers. The Best Student Paper Award went to **Seokjin Kim** of the University of Maryland, College Park for the paper, "Device Verification Testing of High Speed Analog-to-Digital Converters in Satellite Communications Systems". Mr. Kim received a plaque and a check for \$1,000. The Second Place Award went to **Lingfeng Wang** of Texas A&M University for his paper, "Flexible Measurement Point Management in an Industrial Automatic Supervision System". Mr. Wang received a plaque and a check for \$750. Congratulations!

Distinguished Lecturer Event

The IEEE I & M Section Chapter in Malaysia, chaired by Rini Akmeliawati, hosted I & M Distinguished Lecturer, Prof. Abdulmotaleb El Saddik of the University of Ottawa. The event

was held on July 9, 2007 at the Plenary Theatre on the campus of Monash University in Selangor, Malaysia. The lecture, “Ambient Intelligent Environment”, was heard by approximately 30 attendees. The event was sponsored by the Instrumentation and Measurement Society, Monash University, Malaysia, and the IEEE Malaysia Section.

TC News

by Dr Rich Hochberg and Dr Steve Adam

Fall 2007 Technical Committee Reports

The Fall IMS AdCom meeting went very well and I thank the TC chairs for their timely activity contributions. A summary of the main activities appears below.

The AdCom approved a new TC. TC-38, Space Measurements, will be chaired by Dr. John L. Schmalzel. “The purpose of the Technical Committee on Space Measurements is to bring together the community interested in advancing the measurement state of the art in support of space, whether ground-based, onboard spacecraft, associated with habitation, etc. The TC will:

- “Organize special-interest sessions at IMS-sponsored conferences and at other appropriate venues;
- Coordinate meetings to bring together groups with focused interests;
- Coordinate with other TC’s and Standards Bodies with related interests;
- Develop and promulgate standards; and
- Perform other activities appropriate to the scope and interests of the TC.”

People interested in participating in this TC are encouraged to contact Professor Schmalzel.

Standards activity continues as TC-5’s IEEE STD 287-2007 on high frequency connectors has been updated and has gone into print. TCs-9, 10 and 11 have on-going updates to the Standards under their responsibility. Of special note is the initiation of TC-25 on Medical Measurements to become recognized as a Standards TC. TC-25 has taken the initiative to start the process of developing a new Standard on Blood Pressure Measurement. They have initiated the required initial documentation, and have started the process to become recognized as an IEEE Standards TC.

If you would like to become active in a Society TC activity, or are interested in becoming the coordinator, please contact me (rhochberg@ieee.org).

Thanks,

Rich and Steve

TC-2 DC-LF Measurement: by Yicheng Wang

- TC-2 is currently helping organize tutorials (with topics related to DC-Low frequency) for I²MTC 2008. This is part of TC-2 effort to collect ideas to guide future TC-2 activities.

TC-3 Frequency and Time: by Eva Ferre-Pikal

- The TC-3 has been working on updating IEEE Std. 1139, Standard Definitions of Physical Quantities for Fundamental Frequency and Time Metrology – Random Instabilities.
- We just finished the first draft and expect to have a final document ready for balloting by the end of the year.

TC-4 High Frequency Measurement: by Yeou-Song (Brian) Lee

- Continue close communications with the MTT-11, NCSLI, MSC, and ARFTG
- Working group on the scattering parameter measurement standards to the IEEE standards association formed. Current Status: Pending ownership resolution
- Participating in the ANAMET conference on 9/20 and presenting the IEEE 378 draft to the members.
- Nick Ridler of the National Physical Laboratory, UK, agreed to sit in a session organized by TC-33 and the European Microwave Conference.
- Continue recruiting members to join this committee.
 - Liaison with other professional societies in the high frequency measurement.
 - With the resolution of the standards association on the IEEE 378 ownership, initiate a working group meeting on the scattering parameter measurement standards within 6 months
- The activities concerned the analysis of the field and the identification of potentials for our technologies and knowledge.

TC-7 Signals & Systems in Measurement: by Laszo Sujbert

- The activity of the TC in the last period focused on the research of some technologies present already in electrical engineering but not generally used in the field of signal processing. These are the following:
 - distributed signal processing in sensor networks
 - sensor fusion and system identification applied for such systems.
- In the IMTC 2007 held in Warsaw, we proposed a test system which could be a common platform for research and development of distributed signal processing systems. The system integrates a set of nodes and a signal processor based unit. The proposed generic application for testing is an active noise control system, the feedback part of which comprises a sensor network for sensing the noise to be suppressed.
- TC-7 is also active in biomedical engineering. The development in the chapter recently focuses on ambient assisted living applications.

TC-9 Sensor Technology: by Kang Lee

- The Technical Committee on Sensor Technology TC-9 sponsored the following working group (WG) activities in standards development.
 - **IEEE 1451.0 - Common Functionality and TEDS WG:** Worked with the IEEE editor in preparation of the IEEE 1451.0-2007 standard for publication in the fall 2007.
 - **IEEE 1451.5 - Wireless Sensor WG:** Worked with the IEEE editor in preparation of the IEEE 1451.5-2007 standard for publication in the fall 2007.

- **IEEE 1451.7 – Sensor and RFID Integration WG:** The working group conducted biweekly teleconference calls to develop draft specifications of IEEE1451.7, Standard for a Smart Transducer Interface for Sensors and Actuators - Transducers to Radio Frequency Identification (RFID) Systems Communication Protocols and Transducer Electronic Data Sheet Formats
- **IEEE 1588 - Precise Networked Clock Synchronization WG:** The IEEE 1588 WG conducted biweekly teleconference calls to work on the draft specification of the version II of the IEEE 1588 standard. The draft was balloted in July-August. Currently the working group is addressing the balloted comments.
- **Coordination with IEEE on Liaison:** Kang has initiated discussion with the IEEE International Standards Program office on establishing liaison with the ISO/IEC subcommittee on mobile item identification management.
- **Wireless Sensors Session at AUTOTESTCON 2007:** A “Wireless Sensors” session was held at the AUTOTESTCON 2007. Three papers supporting IEEE 1451 standards were presented. Two papers were presented by two TC-9 committee members and one presented by an OGC member.
- **Invited to talk about IEEE 1451 Standards in China:** Upon invitation, 1) a keynote on “IEEE 1451 Smart Transducer Standards” was given at the 2007 International Conference on Electronic Measurement and Instruments in Xian, China, and 2) two talks, “IEEE 1451 Smart Sensor Networks and Sensor-Integrated RFID” and “Object-oriented Framework for IEEE 1451 Standards” were given at the China Academy of Sciences, Institute of Automation in Beijing, China. Contacts were made in China who are interested in establishing a local I&M Section in Beijing and in cosponsoring workshops and conferences in the coming years.
- **In preparation of the 2007 ISPCS Symposium:** The 2007 International IEEE Symposium on Precision Clock Synchronization (ISPCS) for Measurement, Control, and Communication, cosponsored by the IEEE I&M Society and Austrian Academy of Sciences, and technically cosponsored by NIST, IEEE Systems Council, and IEEE Industrial Electronics Society, is to be held on Oct 1-3 in Vienna, Austria.. Kang is the technical program co-chair. He has worked closely with the co-chair at the Austria Academy of Sciences on all aspects of the conferences including the coordination of review and selection of papers, program formulation, proceedings, and organization of the plug fest was completed. See web site: <http://www.ispcs.org>.
- **Planned activities for the next six months:**
 - The IEEE 1451.7 WG will continue the development of the draft specification for the sensor to RFID tag interface standard.
 - The IEEE 1588 WG plans to complete the balloted draft for recirculation in November 2007.
 - Continue to work with the IEEE editors to prepare the approved IEEE 1451.0 and 1451.5 drafts for publication as standards.
 - Continue to work with the Austrian Academy of Sciences to hold the 2007 International IEEE Symposium on Precision Clock Synchronization for Measurement, Control, and Communication in Vienna, Austria.
 - Begin discussion with the University of Michigan in hosting 2008 ISPCS in Michigan.

TC-10 Waveform Generation, Measurement, and Analysis: by Thomas Linnenbrink

- TC-10 is actively developing four major standards:
 - The revision of IEEE Std 1057-1994 (Standard for Digitizing Waveform Recorders);
 - The revision of IEEE Std 1241-2000 (Standard for Terminology and Test Methods for Analog-to-Digital Converters);
 - The development of IEEE Std P1658 (Standard for Terminology and Test Methods for Digital-to-Analog Converter Devices; and,
 - The development of IEEE Std P1696 (Standard for Terminology and Test Methods for Electronic Probes). Effort continues to persuade the IEC to adopt IEEE Std 181-2003 (Standard on Transitions, Pulses, and Related Waveforms).
- The committee members reviewed the latest version of the working drafts of 1057, 1658, and 1241 at our May 2007 meeting in Tucson, AZ, hosted by Texas Instruments. Preliminary investigation into methods of characterizing high-frequency probes and their test fixtures continued at the May meeting to form the technical foundation for 1696. A tutorial on ADC fundamentals, selection, test, and calibration was presented at IMtc2007 in Warsaw, Poland on April 30, 2007. The fall 2007 TC-10 meeting is scheduled for October 15 - 18, 2007 in Boston, MA (sponsored by LTX). The winter meeting is tentatively scheduled for February 2008 in Colorado Springs, CO. Specific activities of the five subcommittees are described below.
- **Subcommittee on Pulse Techniques (SCOPT) (181) (Nick Paulter, Chair):** The SCOPT chairman has been accepted as a member of the ANSI US Technical Advisory Group (TAG) to the IEC TC85, which is the IEC technical committee responsible for the IEC 60469-1 and -2, which were almost verbatim copies of the IEEE Stds. 181-1974 and 194-1974. The Std 181-2003 will be due for a maintenance action (revise, reaffirm) by the end of 2008 and the IEC is considering revisions to the 60469 series. Consequently, this may be the ideal timing for seeking adoption of a revised Std 181 by the IEC. SCOPT will likely opt to revise the Std 181 because of interest in including parameters for impulse-like pulses and in correcting an error discovered in one of the figures. SCOPT is in the process of developing numerical methods for generating reference waveforms for use in pulse parameter algorithm characterization.
- **Waveform Measurement Subcommittee (1057) (Bill Boyer, Chair):** The Waveform Recorder Subcommittee of TC-10 is actively working on an updated version of IEEE Standard 1057 on testing waveform recorders. The initial ballot was completed in April and was approved with requests for editorial changes. Changes were made and a recirculation ballot was completed in June. The standard was approved with one negative ballot on editorial issues. These issues will be resolved during final editing and printing. The next step was for the standard to be approved by RevCom. It was on the agenda for the September meeting. However the RevCom staff said the document looked too much like a Recommended Practice Guide instead of a Standard. We want 1057 to be a standard. We revised the document to meet the RevCom objections and have obtained their preliminary approval. This document is being circulated to the working group. Once it is finalized, we will conduct another recirculation ballot and hopefully get the standard approved at the December RevCom meeting. Assuming RevCom approval we expect the standard to be printed in mid 2008. We also had to request that the PAR be amended so that the Scope statement in the PAR was identical to the one in the draft. This change was approved by NESCom in August

along with an extension for the project to the end of 2008. We will have to request another PAR amendment since both the Scope and Purpose clauses in 1057 have been modified at the request of RevCom.

- **ADC Subcommittee (1241) (Steve Tilden, Chair):**

The committee met on May 15, 2007 in Tucson, Arizona and continued aggressive editing and re-writing the maintenance draft update. It will meet again in October, in Boston, Mass. where further progress will be made on the draft. The committee also participates in IMTC quite widely and ADC Forum conferences. During the past year, it also published several tutorials on ADC Architectures and test methods in the I&M Magazine. A three-hour tutorial was presented at the IMTC 2007 in Warsaw, Poland. Further publication is planned for future conferences and publications to spread the word about the standard and solicit input from non-members. This committee is also trying to increase its working membership to speed the process.

- **DAC Subcommittee (P1658) (Steve Tilden, Chair):**

The committee met on May 17, 2007 in Tucson, Arizona and made significant progress towards creating the initial draft. It will meet again in October in Boston, Mass. to continue that work toward creating an initial draft for ballot before the PAR deadline. This committee is also aggressively recruiting new working members to gain momentum toward draft completion.

- **Subcommittee on Probe Standards (SCOPS) (P1696) (Robert Graham, Chair):**

Nick Paulter, the previous Chair of SCOPS, has changed jobs and will be unable to continue as Chair of P1696; Robert Graham has assumed the position. The *Working Group Chair Change Form* was faxed to the NESCOM Administrator on September 5, 2007. SCOPS has been meeting regularly, both in-person at the regular TC-10 meetings and by teleconference. The SCOPS Internet home page has been launched (<http://grouper.ieee.org/groups/1696/index.html>), and the password-protected private area is also active. Progress is being made on the standard, with emphasis on characterizing test fixtures for testing high-frequency probes using both time-domain and frequency-domain techniques. The next meeting will be on October 15th in the Boston area (location information is available at the TC-10 web page).

TC-11 SCC-20 Coordinators: by Joe Stanco

- Much progress has been made in the incorporation of ATML which define a collection of XML-based schemas that allows ATE and test information to be exchanged in a common format adhering to the XML standards in a number of IEEE SCC20 standards. The SCC20 is the standards organization through which the ATML components will be published.
- In addition, the Hardware Interfaces (HI), Diagnostic and Maintenance Control (DMC), Test Description (TAD) and Test Information Integration (TII) committees which met in Madrid, Spain on April 16th through the 20th 2007 had made progress in their areas. The following gives a status of the various standards with ATML components.
 - ATML Overview and Architecture IEEE Std 1671-2006 Published December 2006
 - IEEE P1636.1 (Test Results) Trial-Use Standard published
 - IEEE P1671.3 (UUT Description) Trial-Use Standard is in formal ballot process
 - IEEE P1671.4 (Test Configuration) Trial-Use Standard is in formal ballot process
 - IEEE P1671.5 (Test Adapter) Trial-Use Standard started formal ballot process

- IEEE P1671.6 (Test Station) Trial-Use Standard started formal ballot process
- IEEE P1671.2 (Instrument Description) Trial-Use started formal ballot process
- IEEE P1671.1 (Test Description) Trial-Use Standard started formal ballot process
- Diagnostics (AI-ESTATE - 1232), Signal Description (STD - 1641), Signal Description (STD - 1641), Maintenance Action Information (MAI - P1636.2) to have candidate schemas for all ATML components.

TC-15 Virtual Systems in Measurements: by Emil Petriu

- Organized, in collaboration with TC-27 Human-Computer Interfaces and Interaction and TC-28 Instrumentation and Measurement for Robotics and Automation, of the **2007 IEEE International Conference on Virtual Environments, Human-Computer Interface, and Measurement Systems - VECIM 2007**, Ostuni, Italy, 25-27 June 2007.
- Organized, in collaboration with TC-27 Human-Computer Interfaces and Interaction, TC-28 Instrumentation and Measurement for Robotics and Automation, and TC-37 Measurements and Networking of the **HAVE 2007 - IEEE International Workshop on Haptic Audio Visual Environments and their Applications**, Ottawa, ON, Canada, 12-14 October 2007.
- Organized, in collaboration with TC-7 Signals and Systems in Measurement, TC-20 Transportation Systems, TC-27 Human-Computer Interfaces and Interaction, TC-28 Instrumentation and Measurement for Robotics and Automation, and TC-30 “Security and Contraband Detection” Technical Committee of the **ROSE 2007 - IEEE International Workshop on Robotic and Sensors Environments**, Ottawa, ON, Canada, 12-13 October 2007.

TC-16 Laser and Optical Systems in Measurements: by Thierry Bosch

- We will sponsor at least 2 conferences :
 - CMOI, November 2007, France (French National Conference on Optoelectronic Measurements for Industry)
 - ODIMAP, July 2009, France (6th Topical Meeting on Optoelectronic Distance/Displacement Measurements and Applications)

TC-17 Materials in Measurements: by Jacob Scharcanski

- Recently, we identified the need to increase the benefits of society membership to international members, and started a group of professionals acting in the international community, to plan and propose new directions for TC-17. At the present stage, the group is in the process of articulating new activities, such as special journal issues, meetings and special interest sessions in the society conferences. We are particularly interested in activities that can :
 - contribute to increase the synergy among TC-17 affiliates;
 - create opportunities for collaborations between researchers, and
 - promote the cross-fertilization of different research fields facing similar measurement challenges.
- One of the new themes that are emerging in our discussions is ‘biomaterials in measurements’.
- All members of the IEEE IMS are most welcome to join the group, and also are invited to provide their input(s)/suggestion(s) by e-mailing :
 - Bill Sampson, w.sampson@manchester.ac.uk
 - Gladimir Baranoski, gvgbaran@curumin.math.uwaterloo.ca
 - Jacob Scharcanski, jacobs@inf.ufrgs.br

TC-19 Imaging Measurements: by George Giakos

- The TC-19 Technical Committee contributed to the 2007 IMTC, International Technical Conference, in Warsaw, by soliciting high-quality papers, participating into the review process and organizing several sessions in Imaging;
- Following the IMTC Technical Conference, the TC-19 Committee organized the 2007 IEEE International Workshop in Imaging Systems and Techniques (IST 2007) that took place in Krakow; more than 50 high-quality papers were presented. The valuable administrative assistance and support provided by Chris Dyer is acknowledged.
- The TC-19 Committee, under the guidance of Steve Adam, has been involved in the realization of an industrial forum aimed to strengthen the links between industry and the TC-19 Technical Committee. Preliminary recruitment has been started.
- Dr. George Zentai, Varian Medical Systems, has been appointed as one of the Co-Chairs, of the TC-19 Committee. George is considered a strong asset to the Committee and the Society as well, because of his outstanding technical skills and good character.

TC-20 Transportation Systems: by Frans C.A. Groen and Georg Brasseur

- Organized, in collaboration with TC-27 Human-Computer Interfaces and Interaction and TC-30 Security and Contraband Detection, of a special session on “**Sensor Networks for Environmental Protection**” and a special session on “**Flow Sensors**” at the “**IMTC/2007 - IEEE Instrumentation and Measurement Technology Conference**,” May 1-3, 2007, Warsaw, Poland.
- Supported Emil Petriu as a member of the Technical Program Committee of VECIMS 2007-International Conference on Virtual Environments, Human-Computer Interfaces, and Measurement Systems, to be held in Ostuni, Italy, 25-27 June, 2007, <http://www.ewh.ieee.org/soc/im/vecims/vecims2007/organizers.html>.
- Contributing to the organization, in collaboration with TC-15 Virtual Systems, TC-27 Human-Computer Interfaces and Interaction, TC-28 Instrumentation and Measurement for Robotics and Automation and TC-30 Security and Contraband Detection, of the **ROSE 2007 - IEEE International Workshop on Robotic and Sensors Environments**, Ottawa, ON, Canada, 12-13 October 2007.
- Our work on establishing a new Master of Engineering study at TU-Graz called “Automotive Software and Electronics” with a new chair plus department called “Embedded Automotive Systems” is almost finished. The Master study will start in the fall term 2007 on October 1st, 2007. Our attempt is totally in compliance with the view of “Transportation Systems”.
- In the process of organizing special sessions at I²MTC 2008.

TC-21 Built in Test (BIT): by Robert Gao and Dennis Hecht

- The committee was involved in the following professional activities:
 - Served on the technical program committee of the 2007 IEEE Sensors Conference and were involved in paper reviews and session organization. Will chair two technical sessions at the conference, to be held October 28-31 in Atlanta, GA.
 - Served as a Co-Guest Editor for a Special Issue of the IEEE Transactions on Instrumentations and Measurement.
 - Served on the publication committee of the 8th International Symposium on Measurement Technology and Intelligent Instruments, to be held in September, 2007 in Sendai, Japan.

- Started a new collaborative research project with the National Institute of Standards and Technology on parametric measurement of bearing wear for rotary machine condition diagnosis and prognosis. Participated in the 6th International Workshop on Structural Health Monitoring at the Stanford University and presented papers.
- Initiated new collaborative research projects sponsored by the National Science Foundation and National Institutes of Health on integrated sensing for human activity monitoring and reconfigurable sensor networks.
- For the next reporting period, the Committee plans to engage in the following activities:
 - Continue to promote research and development efforts in built-in test and self-test for applications in the industry.
 - Identify areas for future research in electronics and dynamic systems diagnosis and remaining service life prognosis.

TC-22 Intelligent Measurement Systems: by Cesare Alippi and Mel Siegel

- The Committee is promoting:
 - basic research on computational intelligence (soft computing and composite technologies) in instrumentation and measurement systems and their applications;
 - research on intelligent distributed sensing networks based on soft-computing components;
 - research on computational intelligence methodologies and techniques for adapting processing systems;
 - use of computational intelligence technologies in instrumentation and measurement for intelligent manufacturing applications, homeland protection and personal safety.
- The Committee has organised the 2007 IEEE International Conference on computational Intelligence for Measurement Systems and Applications, 27-29 June 2007, Ostuni – Italy, sponsored by the IEEE I&M Society and the IEEE Neural Networks Society. The committee has also collaborated in the organization of the co-located IEEE International Conference on Virtual Environments, Human-Computer Interfaces and Measurement Systems (VECIMS) 25-27 June 2007.
- Within the “Intelligent measurement systems” Task Force of the Intelligent Systems Applications Technical Committee (IEEE Computational Intelligence Society), TC-22 has organised the “*Computational Intelligence for Intelligent Measurement Systems*” at the IEEE International Joint Conference on Neural Networks, Orlando, August 12-19, 2007
- To promote the committee research areas within other IEEE societies. TC-22 has given technical cooperation to the Reef Barrier Monitoring project aiming at monitoring the great reef barrier with a wireless sensor network technology. The experimental deployment will be carried out at Moreton Bay, Queensland, AUS, 19-20 November 2007.

TC-23 Education for Instrumentation and Measurements: by Theodore Laopoulos

- TC-23 organized two special sessions at the IMTC-2007, last May in Warsaw, Poland. Following the series of successful special sessions on educational issues at the previous IMTCs, this year the session was focused on “WEB-based Educational Tools and Labs” and 5 papers were presented and discussed. Due to the large number of contributions, we had a second session in the same field with the title “Distributed Measurements Systems

for Educational Labs”. A total of 10 papers were presented and discussed in these two sessions, coming from 8 different countries.

- TC members were also engaged in the organization of the 4th International Workshop on “Intelligent Data Acquisition and Advanced Computing Systems” – IDAACS’07, September 6-8, 2007, Dortmund, Germany, and also in a special issue of the International Journal of Computing devoted on Virtual Instrumentation (VI) and Virtual Laboratories (VL) - Prof. W. Winiecki from Poland is co-editor of this issue.
- A meeting of the TC members was held in Warsaw, aiming to explore the interest of participating persons to start activities of two “Working Groups” on the following subjects: 1) a group that will try to check the operating capabilities of different web-based systems for remote laboratory education which have been developed by members of this TC, and 2) a group which will try to analyze and define the appropriate subjects which should be included in the curriculum of a university degree (probably in different courses) in order that the graduates have a satisfactory background knowledge on I&M related issues. There is a very good interest in this direction (mainly for the second group on “I&M related content in curricula”). Unfortunately, both groups have not started yet, but we expect to start in October 2007. Practically all activities will be conducted by emails or via the web. Those interested please contact TC-23 chair, at t.laopoulos@ieee.org

TC-25 Medical and Biological Measurements: by **Marco Parvis**

- The TC organized the second edition of MeMeA (MeMeA-2007 in Warsaw) with a good success and more than 25 attendees.
- At the same time, the TC organized some special sessions on medical measurement at IMTC2007.
- The TC now is planning the next MeMeA edition in 2008 in Ottawa, with the collaboration of Dr. Voicu Groza, who is also the leader of a TC subcommittee on Blood Pressure Measurement.
- The TC is also trying to participate and sponsor a new standardization initiative on Blood Pressure Measurement.

TC-26 Radar Cross-Section Measurements: by **Mark Yeary**

- This committee is currently promoting radar based atmospheric measurements, severe weather detection, and multiple airborne hazard detection at the new \$67M National Weather Center that was recently opened at his university.
- Prof Yeary is the Principle Manager of a new 4000 sq. ft. laboratory that is devoted to next-generation radar design, which is called the Radar Innovations Laboratory. Fully instrumented with new equipment rated up to 50 GHz, it is a premier facility for designing, fabricating, and testing prototype radars, and conducting radar-related research and education. Current projects are sponsored by NOAA, NASA, Raytheon, and the NSF. Under the lab’s Visiting Interdisciplinary Scientist Arrangement (VISA), external scientists are welcome to use the laboratory to foster external collaborations. Dr. Yeary will attend the IIMTC annual conference in May of 2008, and please feel free to contact him anytime.

TC-27 Human Computer Interface and Interaction: by **Mel Siegel** and **Peter Wide**

- TC-27’s activities have largely revolved around the two small conferences HAVE (Haptic, Audio, and Visual Environments) and ROSE (Robotic Sensors and

Environments) that this year are co-located in Ottawa ON CA (and, regrettably for this reporter, co-tempuras with the AdCom meeting in Stresa).

- See <http://www.site.uottawa.ca/ROSE2007/> for the ROSE website, and see <http://www.discover.uottawa.ca/have2007/index.html> for the HAVE website.
- HAVE is co-sponsored by:
 - TC-15 Virtual Systems of the IEEE I&M Society and the TC-28 Instrumentation and Measurement for Robotics and Automation of the IEEE I&M Society,
 - TC-27 Human-Computer Interfaces and Interaction
 - TC-37 Measurements and Networking of the IEEE I&M Society
 - IEEE Computational Intelligence Society,
 - IEEE/CIS Virtual Reality Task Force with the technical cooperation of the IEEE Instrumentation and Measurement Society and the Ottawa Chapter of the IEEE I&M Society
- HAVE is moving in the direction of becoming a major actor especially in the haptics field, which is experiencing renewed interest and applications as high-quality off-the-shelf hardware has recently begun to emerge. While high quality, it suffers from two problems: inadequate software and high cost. Many of the HAVE papers address these issues. Researchers and developers in the computer game arena are increasingly interested, and it is under consideration to permanently include “games” or “entertainment” in the conference name.
- ROSE is co-sponsored by
 - TC-7 Signals and Systems in Measurement
 - TC-15 Virtual Systems
 - TC-20 Transportation Systems
 - TC-27 Human-Computer Interfaces and Interaction
 - TC-28 Instrumentation and Measurement for Robotics and Automation
 - the Ottawa Chapter of the I&M Society
- ROSE is moving in the direction of becoming a major actor especially in the symbiotic man-machine operating environments, i.e., people and robots working side-by-side and collaboratively. To achieve this symbiosis safely and productively it is necessary to envision, develop, and integrate new and improved sensing and software modalities that enable the robots better to perceive the humans, the human better to perceive the robots, and where feasible, for sensors embedded in the environment to assist both.
- The founders of both HAVE and ROSE, with the support of TC-27, have taken active steps to broaden the participation of colleagues outside the North American and European regions in these conferences and the sponsoring TCs. As a result, the officers and program committees of both are now composed largely of new faces from regions that are under-represented in I&M participation and positions of visibility.

TC-28 Instrumentation and Measurement for Robotics and Automation: by Mel Siegel and Emil Petriu

- Organized, in collaboration with TC-15 “Virtual Systems in Measurements” Technical Committee and TC-27 Human-Computer Interfaces and Interaction, the *2007 IEEE International Conference on Virtual Environments, Human-Computer Interface, and Measurement Systems - VECIMS’2007*, Ostuni, Italy, 25-27 June 2007.

- Organized, in collaboration with TC6 - Emerging Technologies, TC22 -Intelligent Measurement Systems, and the TC on Industrial Systems Applications - Task Force on Intelligent Measurement Systems of the IEEE Computational Intelligence Society, of the **2007 IEEE International Conference on Computational Intelligence for Measurement Systems and Applications CIMSA'2007**, Ostuni, Italy, 27-29 June 2007.
- Organizing, in collaboration with TC-15 Virtual Systems, TC-27 Human-Computer Interfaces and Interaction, and TC-37 Measurements and Networking of the **HAVE'2007 - IEEE International Workshop on Haptic Audio Visual Environments and their Applications**, Ottawa, ON, Canada, 12-14 October 2007.
- Organizing, in collaboration with TC-7 Signals and Systems in Measurement, TC-15 Virtual Systems, TC-20 Transportation Systems, TC-27 Human-Computer Interfaces and Interaction, and TC-30 "Security and Contraband Detection" Technical Committee of the **ROSE 2007 - IEEE International Workshop on Robotic and Sensors Environments**, Ottawa, ON, Canada, 12-13 October 2007.

TC-30 "Security and Contraband Detection": by Emil Petriu, Vincenzo Piuri, and Mel Siegel:

- Organized, in collaboration with TC-20 Transportation Systems and TC-27 Human-Computer Interfaces and Interaction, of a special session on "Sensor Networks for Environmental Protection" at the "IMTC/2007 - IEEE Instrumentation and Measurement Technology Conference," 1-3 May 2007, Warsaw, Poland.
- Contributing to the organization, in collaboration with TC-7 Signals and Systems in Measurement, TC-15 Virtual Systems, TC-20 Transportation Systems, TC-27 Human-Computer Interfaces and Interaction, and TC-28 Instrumentation and Measurement for Robotics and Automation, of the **ROSE 2007 - IEEE International Workshop on Robotic and Sensors Environments**, Ottawa, ON, Canada, 12-13 October 2007

TC-31 I&M for Homeland Security: by Kang Lee and Brian Wadell.

- Activities in the last six months:
 - **Sensor Standards Harmonization:** Kang Lee organized and conducted a Sensor Standards Harmonization Working Group meeting on June 26, 2007 at NIST. The working group meeting aimed to coordinate sensor-related standards activities in industry and government in support of DHS S&T for their interest in sensor networking and interoperability. Participants include representatives from DoD, DHS, DoJ, JPEO-CBD, NIST, NOAA, EPA, ISA, OGC, and the private sectors. Kang introduced the idea of Sensor and Network Plugfest at the meeting aiming to provide a forum for sensor developers and users in industry, academia, and government to discuss and test for interoperability of wired and wireless sensor networks and applications.
 - **Participated at the ANSI HSSP Transit Security Workshop:** Upon invitation, Kang Lee participated as a panelist and presented a talk on IEEE 1451 Sensor Standards at the American National Standards Institute (ANSI)'s sponsored Homeland Security Standards Panel (HSSP) workshop on Transit Security. Technologies and standards applicable to securing the transportation systems were discussed.
- Planned Activity for the next 6 months:

- The next Sensor Standards Harmonization and Plugfest meeting is planned to be held on Oct 16, 2007 at NIST. Interested party can contact Kang at kang.lee@nist.gov.

TC-32 Fault Tolerant Measurement Systems: by Nohpill Park and Serge Demidenko

- In cooperation with Prof. Sunil Das, TC-32 produced a very substantial and very well attended Special Session SS-11 “Reliable Design and Test of System-on-Chip - Instrumentation and Measurement Perspectives” at IIMTC 2007. The Special Session included 15 technical papers plus and an introductory plenary technical talk supported by the IEEE CS Distinguished Visitor Program
- The success of the Special Session has encouraged TC-32 to propose a new Special Session “Design, Manufacturing and Test of Reliable System-on-Chip (SoC) and System-in-Package (SiP) for the forthcoming I²MTC 2008. The session description is available on the web - http://www.ieee-ims.org/imtc/imtc_2008.php
- The proposal has been developed for the special issue of the International Journal of Intelligent Systems Technologies and Applications (IJISTA) on Dependable and Fault Tolerant Sensing Technology. Once approved by the Editorial Board the TC-32 will start to solicit papers for the special issue.
- Session on Ubiquitous and Dependable Sensors has been arranged and scheduled at the 2nd International Conference on Sensing Technology, November 26-28, 2007, Palmerston North, New Zealand
- There could be also an opportunity to hold one more special session on the topic related to TC-32 at the 4th IEEE International Symposium on Electronics Design, test and Applications – DELTA 2008, Hong Kong, January 2008 (to be confirmed)
- The initiative towards assisting in creating the IEEE I&M Chapter in New Zealand is progressing however it may take some more time to build up the required membership and to start relevant activities in the country.
- Unfortunately two items of our previous plan have not been realized due to lack of cooperation from the Organizing Committee of the 22nd IEEE International Symposium on Defect and Fault Tolerance in VLSI Systems (DFT' 07) – September, 2007, Rome, Italy (Special Session at the Symposium and a special issue of the IEEE Transactions on Instrumentation and Measurement on DFT'07)

TC-33 Characterization of Electrical HF and Optical Nonlinear Components: by Marc Vanden Bossche and Yves Rolain

- Organized a track of 3 sessions at IMTC 2007, titled “Advances in microwave measurements”, with very good attendance.
- Organizing the kick-off meeting for the effort on “Phase calibration for modulated signals”. The meeting is to be held at the EUMC 2007 conference.

The final goal is to bundle all the efforts in the calibration of modulated multi-carrier signals. The goal of this meeting is to make an inventory of the current state-of-the-art and the needs of the measurement community.

- Co-Sponsored by network of excellence TARGET.

- Organization of a track of microwave measurement sessions at I²MTC 2008 .

TC-36 Industrial Inspection by Zheng Liu and David Forsyth

- We (Liu and Forsyth) are going to chair a section at the 17th World Conference on Non-destructive Testing (WCNDT). One of us will give a presentation on the idea of creating the standards for NDT data format.

- We also plan to invite two talks. One is Dr. Kang Lee (on IEEE 1451); the other is about NDT image format from ASTM.
- We have submitted a special issue proposal to the journal of “Machine Vision and Applications” together with another two researchers from US and Japan. The title of the special issue is “Integrated Imaging and Vision Techniques for Industrial Inspection”. The proposal is currently under review.

TC-37 Measurements for Networking by Claudio Narduzzi and Abdulmotaleb El Saddik

- The TC participated in the organization of the 6th edition of IEEE HAVE (HAVE-2007 in Ottawa) with a good success and more than 32 papers accepted. At the same time, the TC proposed to organize special sessions on measurement and networking at I²MTC 2008.

Column Summaries

My Favorite Experiment (Summary)

By John Witzel

Tonight There Are Hundreds of Visible Satellites in Orbit, How Many Can You Spot?

“The night sky is alive and moving, but only if you know where to look.

Since the first earth orbiting satellite was launched back on October 4th, 1947, the sky has become crowded, very crowded. Sputnik may have led the race to space but many, many have followed. So many that the geosynchronous satellite belt over the equator now has separation distances measured in fractions of a degree; that’s crowded!”

(These two paragraphs are taken from the column as a summary.)

Instrumentation Notes (Summary)

By Bruno Andò, Nicolò Savalli

CANBUS Networked Sensors Use in Orientation Tools for the Visually Impaired Wired vs Wireless Technology

“Networked sensors, both wired and wireless, have allowed great improvement in the perception of our “environment”. These sensors provide dense sensing close to physical phenomena, processing and communicating this information, and coordinating actions with other nodes. Networked sensors could be a convenient way to boost site accessibility for people with a disability. An assistive tool for the Visually Impaired must be for everyone and to everywhere: it should be easy to use, easy to interpreted, should avoid masking natural echoes, should be flexible and reconfigurable and should convey a suitable degree of information.

In this column, new results concerning the CANBUS assistive system developed at the DIEES laboratories to support Visually Impaired people in orientation and mobility tasks are presented with emphasis on the user’s localization feature.”

(These two paragraphs are taken from the column as a summary.)

New Products (Summary) By Robert Goldberg

Configurable RF Test Platform, by Aeroflex

Modular RF test platform for wireless applications up to 6 GHz

www.aeroflex.com

Arbitrary Waveform Function Generator, by Geotest-Marvin Test Systems

The GX1110, a high performance, single-channel, PXI signal generator

www.geotestinc.com

Wireless Sensor Network with enhanced features, by Banner Engineering Corp

The DX70 SureCross™ Wireless Network

Visit www.bannerengineering.com

System Switch Platform with High Throughput Signal Switching, Keithley Instruments, Inc.

The Series 3700 System Switch/Multimeter and Plug-in Card Family

www.keithley.com/pr/076.

New Platform for Effort-Saving Test-System Creation, by Agilent

The latest version of the Agilent Virtual Rack platform

www.agilent.com/find/virtualrack.

Multifunction USB Data Acquisition Products, by Measurement Computing

Three new 1-MHz, 16-bit multifunction USB data acquisition devices and a cost-saving expansion module for high channel count applications

www.mccdaq.com.

New Programmable Radiometer/Photometer, by Labsphere, Inc

The SC 6000 programmable radiometer and photometer, a versatile system controller

www.labsphere.com

Multiport Serial Cards Offer High-Speed Communication and Flexible Connectivity Options, by Comtrol Corporation

The next generation of multiport serial adapters, RocketPort INFINITY in-server serial port expansion cards

www.comtrol.com

PC Oscilloscopes, Now Offer Enhanced Resolution and Fast USB Data Streaming, by Pico Technology

The PicoScope 3224 and 3424 high-precision PC Oscilloscopes are now able to offer 16-bit resolution when used with the latest PicoScope 6 software release

www.picotech.com

Precise Automatic Location Station, by Leica Geosystems

The new Leica TPS1200+ Total Station

www.leica-geosystems.us

Oscilloscope Card For PCI Express Can Record 2 Channels At 200 MS/S, by Strategic Test Corp

The UF2e-2031 oscilloscope PCI Express card.

www.strategic-test.com.

New PXI Instrumentation Amplifier, by TEGAM, Inc.

50MHz PXI Instrumentation Amplifier, its first PXI product, Model 4040A

www.tegam.com/4040A

Expanded Machine Vision Reading Capability, by Cognex Corporation

new features that expand the power and capability of the high-performance DataMan™ 100 family of image-based ID readers.

www.cognex.com

Autonomous Underwater Vehicle Features Point-And-Click Mission Planning, by
OceanServer Technology, Inc. of Fall River, MA

A simple to operate, fully portable autonomous underwater vehicle (AUV) that uses standard geo-referenced charts from NOAA or USGS or satellite images
www.ocean-server.com.

Feature Articles (*Summaries*)

Lessons Learned on Five Large-Scale System Developments (*Summary*)

by Nat Ozarin

“System planners, architects, and developers often make the same mistakes on grand scales, but we usually stay with familiar approaches, especially under deadline pressures. Engineers and managers embrace the concept of process improvement yet rarely take time (or have the privilege of taking the time) to consider how something that has worked in the past could be improved. It is equally rare for them to make the effort to change plans and processes to benefit from mistakes.

This article explores several high-level lessons learned, mostly on large system developments that were not always successful. The lessons concern project difficulties caused by: thinking that’s stuck in the present; excessive faith in code re-use; failure to see the big picture; absence of independent failure analysis; and estimation processes driven by fear and ignorance.” (These first two paragraphs of the article provide the summary.)

This paper was presented at the First Annual IEEE Systems Conference 2007, (© IEEE, First Annual IEEE Systems Conference, used with permission) [9]

[9] N. Ozarin, "Lessons Learned on Five Large-Scale System Developments", in *Proc. of First Annual IEEE Systems Conference 2007*, Hawaii, USA

The contact for this feature is Nat Ozarin (ozarin@ieee.org) at The Omnicongroup Inc. (www.omnicongroup.com).

Multi-Criteria Decision Making in Sensor Networks (*Summary*)

By Prasanna Sridhar, Asad M. Madni, Mo Jamshidi

"The traditional single-sensing system is being replaced by multiple, spatially-distributed sensors that not only sense but also process and communicate critical information and decision milestones. This has been facilitated by the emergence of Microelectromechanical Systems (MEMS) and by the integration of multiple sensors, processors, memory and RF communication devices onto a single board forming a "sensor node". Such nodes are often deployed in large numbers to form a sensor network. MEMS reach significantly higher speeds and higher sensitivity compared to macro-sensors." (This quote is from the first paragraph of the article.)

The authors discuss Multi-Criteria Decision Making (MCDM) in prioritizing system behavior; the Interacting Criteria require a weighting function on a subset; the use of fuzzy measure and the Choquet Integral for evaluation; a case study for MCDM for a mobile robot to collect data, replace dying nodes and deploy more nodes; and behavior assignment for the sensors to determine function and usage in changing situations.

This paper was presented at the First Annual IEEE Systems Conference 2007 (© IEEE, First Annual IEEE Systems Conference, used with permission) [4]

[4] P. Sridhar, A. M. Madni, M. Jamshidi, "Multi-Criteria Decision Making in Sensor Networks", in *Proc. First Annual IEEE Systems Conference, 2007*, Hawaii, USA

A Control System Test Bed for Demonstration of Distributed
Computational Intelligence Applied to
Reconfiguring Heterogeneous Systems (*Summary*)

By S. K. Srivastava, D. A. Cartes, F. Maturana, F. Ferrese, M. Pekala, M. Zink, R. Meeker, D.
Carnahan, R. Staron, D. Scheidt, and K. Huang

This article focuses on integrated ship system control and the management of an electric ship power system and ship service related to control system architecture. The authors introduce this challenging domain and discuss: the key features and design criteria for the problem test bed; the test bed architecture and component description of the water service, power service and heat load; the proposed implementation and test scenario; the test bed modes of operation; and the test scenario. This simulation framework has as a key part, interfaces that allow control systems to interact with hardware and other control systems in real time. Development of these types of systems will allow new types of capabilities for control of power systems on future electric ships.

This paper was presented at the First Annual IEEE Systems Conference 2007, (© IEEE, First Annual IEEE Systems Conference, used with permission) [5]

[5] S. K. Shrivastava, D. A. Cartes, F. Maturana, F. Ferrese, M. Pekala, M. Zink, R. Meeker, D. Carnahan, R. Staron, D. Scheidt, and K. Huang, “A Control System Test Bed for Demonstration of Distributed Computational Intelligence Applied to Reconfiguring Heterogeneous Systems”, *Proc. of the First Annual IEEE Systems Conference 2007, Hawaii, USA*

Tutorial #13

**Output Devices—Actuators and Data Loggers
for Instrumentation (*Summary*)**

“Actuators are an integral part of practical control (and instrumentation) systems. During operation, actuators continuously receive commands from their controllers and drive a plant or process to achieve a pre-specified control objective. The performance of the plant/process and its actuators may be monitored using sensors and transducers. The sensed information may be used for control of the system (feedback control, feedforward control, or supervisory control), generation of other actions (alarms, task sequencing, fault management), and presented or displayed on output devices such as computer screens, data loggers, recorders, and printers. There are a variety of common actuators...

This article introduces the principles, characteristics, control approaches and applications of dc motors, ac induction motors, stepper motors, solenoid actuators, and micro-motors used in process automation. It describes several real industrial actuator products and their specifications and introduced two types of portable data loggers, and points out important technical trends.

It is clear that future applications of output devices will focus on the development of industrial actuators of smaller size, lighter weight, higher output power and torque, and better static and dynamic characteristics. We expect novel mechanisms for force generation and more sophisticated machining techniques to facilitate the realization of these goals.”

(These paragraphs are taken from the article as a summary.)

The contact for this article is Clarence deSilva (desilva@mech.ubc.ca) at the Department of Mechanical Engineering, The University of British Columbia, Vancouver, BC, Canada.
