IEEE
ULTRASONICS, FERROELECTRICS, and FREQUENCY CONTROL SOCIETY NEWSLETTER

Number 35: Spring 2003 Editor: Jan Brown ISSN 1060-0264

JOINT MEETING
2003 IEEE INTERNATIONAL
FREQUENCY CONTROL SYMPOSIUM & PDA EXHIBITION
and
17TH EUROPEAN FREQUENCY AND TIME FORUM
5-8 May 2003
and
TUTORIALS
4 May 2003

Jan u ary 28, 2003

Dear Col leagues and Mem bers:

I would like to welcome the four newly elected AdCom members, and wish them the best of suc cess dur ing their ten ure in the ser vice of the UFFC. I also would like to thank the outgoing AdCom members for their most valu able ser vice to the So ci ety.

As some of you may know, Dr. James Green leaf, the Vice Pres i dent of Ultrasonics and the chair of this com mit tee, has stepped down as of the very be gin ning of 2003. Un der his lead er ship, the Ultrasonics Com mu nity has grown substantially, and for that, we are very thank ful to him. He did a mar vel ous job in deed. Mean while, I would like to welcome the new Vice President of Ultrasonics, Dr. Clemence Rupple, and wish him the best of suc cess.

The year 2002 has in deed been a very ac tive pe riod of time, dur ing which the UFFC has or ga nized three re mark ably suc cess ful in ter na tional meet ings, i.e. ISAF 2002 in Nara Ja pan, Fre quency Con trol sym po sia in New Or leans, and the Ultrasonics sym po sia in Mu nich Ger many. The sci en tific qual ity and the at ten dance in those three meet ings were out stand ing. Es pe cially, the Mu nich meet ing of Ultrasonics has hosted over 950 at ten dees —a re cord in its his tory. I would like to thank all the gen eral chairs, com mit tee chairs and mem bers, and all those who con trib uted in mak ing these sym po sia such a suc cess.

On an other pos i tive note, in the year 2002, the UFFC was one of the fast est grow ing so ci et ies in the IEEE. At a time when the ma jor ity of the 36 so ci et ies showed a de cline in mem ber ship throughout 2002, our so ci ety has been ranked in the top five growth so ci et ies for many months in the year. The rea sons for such growth might be at trib uted to the in crease in the num ber of "ferroelectricians" who have joined UFFC-Ferro elec trics and the state of the art web-based ser vices pro vided by UFFC such as the dig i tal ar chives. And it is my hope that this ex em plary growth of our so ci ety will con tinue in 2003, which again, is intimately related to the mem ber ship's ac tive role in pro mot ing UFFC.

Also regarding last years activities, I would like to tell you that the UFFC's fi nancial status has been steady. In these dire eco nomic con di tions, we have man aged to stay afloat, which, I be lieve, is a clear indication of what we can ac com plish when we pull to gether even in such try ing times. Last year, I have made ev ery ef fort to bring new blood to our ranks, as I al ways be lieved that it would be in the best in ter est to our pro fes sion and our so ci ety. Also, sev eral new vice-chairs of com mit tees have been ap pointed to work with the cur rent chairs so that they can take over as of next year af ter hav ing brought up to speed for a pe riod of one year. I be lieve that will pro vide those com mit tees with an ef fi cient way in deal ing with the tran si tion of au thor ity from the out go ing chair to the in com ing one.

In the be gin ning of 2003, I have ini ti ated an e-mail dis cus sion on the im ple men ta tion of new amend ment(s) in the by laws whereby the term of appointment for the Standing Com mit tee mem bers would be well de fined and lim ited as that of any other officer's such as the President and elected AdCom mem bers. That would en able us the have se nior and ju nior peo ple work to gether over some suit able pe riod of time, thereby re sult ing in a seam less tran si tions in those po si tions. I firmly be lieve that no so ci ety can grow in scope and ser vice with out the re newal and rejuvenation of its think tank.

con tin ued on page 38

UFFC Society Newsletter • April 2003

IEEE Ultrasonics, Ferro elec trics, and Fre quency Con trol So ci ety (ISSN 1060-0264) News let ter is pub lished two times per year by The In sti tute of Elec tri cal and Elec tron ics En gi neers, Inc., 445 Hoes Lane, Piscataway, NJ 08854.

FREQUENCY CONTROL

Joint Meeting
2003 IEEE International
Frequency Control Symposium and PDA Exhibition
and
17th European Frequency and Time Forum
Tutorials on 4 May, Symposium 5-8 May 2003
at the Marriott Waterside Hotel, Tampa Florida, USA

Special Notes

- Cutoff date for hotel room reservations is **April 11, 2003** in order to get the preferred room rates (regular rates are about $70 per night higher). Please
- Reservations can be made by contacting Marriott reservations at 1-888-268-1616, or the hotel directly at 813-221-4900.
- Advance registration for the symposium and tutorials must be received prior to **18 April 2003**.
- Complete symposium information may be found at: http://www.ieee-uffc.org/freqcontrol/2003FCS/2003_FCS.htm

Invitation to attend

The Symposium is sponsored by the IEEE Ultrasonics, Ferroelectrics & Frequency Control Society and the European Frequency and Time Forum; and the Exhibition is sponsored by the Piezoelectric Devices Association

The first joint meeting in the United States of the IEEE International Frequency Control Symposium, the European Frequency and Time Forum and the Piezoelectric Devices Association is scheduled for 5-8 May 2003 at the Marriott Waterside in Tampa Bay, Florida. This unique meeting will combine the technical sessions of the leading conferences in Europe and the United States with the industry's largest commercial exhibition organized by the Piezoelectric Devices Association.

The latest technical developments related to materials, components, and systems will be presented in technical sessions suitable for commercial and academic research scientists, applications engineers, and timekeeping specialists that benefit from knowledge of frequency control technology at current state of the art standards. Those involved directly or indirectly with manufacturing, specifying, measuring, or otherwise using time and frequency control technology will benefit from attendance.

The latest in materials, manufacturing equipment, and frequency control products will be on exhibit in over 50 booths throughout the conference.

Tutorial sessions broadly covering the existing knowledge base of frequency control technology will be offered on 4 May. These tutorials are presented by the most experienced experts in the community and are suitable for new comers and experienced members of technical staffs seeking to upgrade and broaden their knowledge.

This conference will attract over 500 participants from more than 25 countries, providing a special opportunity to attend an especially large number of technical presentations of the highest quality, remain current on commercial developments, and to make new acquaintances in the frequency control community or renew old friendships with colleagues from around the world.

Gary R. Johnson
Sawyer Research Products, Inc.

Symposium Site Information

Tampa is a city of 300,000 people located at the top of Tampa Bay on the western (Gulf) coast of Florida. Tampa enjoys an average May temperature of 25 C (78 F) and more than 300 sunny days per year. Tampa was first a home to Native Americans; the first white settlement in Tampa was in 1823.In the 19th century rapid growth was stimulated by the fishing industry, phosphate mining, construction of railroads and the introduction of cigar making. Tampa today is home to vibrant industry and entertainment and some of the most succulent seafood in the U.S.

The Tampa Marriott Waterside Hotel will host the Symposium in 2003; the Waterside hotel is located directly on the Tampa waterfront, close to downtown and the famous Ybor City. The conference hotel rates extend through the weekend both before and after the Symposium (on a space available basis; please make reservations early), so plan to extend you stay and enjoy the attractions of Tampa.

Tampa's attractions include:

Tampa is the home of Ybor City, the former "Cigar Capital of the World" and location of 200 cigar factories. Demonstrations by master tabaqueros (cigar makers) illustrate the traditional techniques of hand rolled cigars. Ybor City, Tampa's Latin Quarter, has exciting entertainment and restaurants where the Cuban sandwiches are hot and crisp. Visit the legendary Columbia Res-

tau rant for tra di tional Span ish bean soup, paella and ex otic Flamenco danc ing. Visit the Henry Plant Mu seum and ex pe ri ence a quint es sen tial Vic to rian pal ace built in the unique Moor ish revival style to re flect the Gilded Age of rail roads in the U.S. Visit the Florida Aquar ium to see Florida's spec tac u lar wild life in nat u ral set tings. The Aquar ium pro vides a boat tour of Tampa Bay where you can ex pect to see bottle nose dol phins and the doc ile (and en dan gered) man a tees. At the Mu seum of Sci ence and Indus try, ex pe ri ence the winds of a Gulf coast hur ri cane or en joy a film in the OMNI dome the ater. Tampa is also home to Busch Gar dens, a theme park fa mous for its large ex hibit of Af ri can an imals and its trop i cal gar dens.

TransportationInformation

IEEE Travel Ser vices has ne go ti ated ex cel lent rates for travel to the upcoming IEEE Frequency Con trol Sym po sium, 4-8 May 2003 with Con ti nen tal Air lines and United Air lines. You can take ad van tage of these sav ings whether IEEE Travel Services ar ranges your trip, you work with your own agency or cor po rate travel de part ment, or you're a DIY-er, book ing your own travel on line through the air line.

The IEEE Travel Team also offers substantial benefits with other carriers, if you arrange travel through IEEE Travel Ser vices.

Lower-than-pub lished air fares are avail able through use of unique Meet ing Travel Codes. Please note, these codes have been es tab lished for use for the IEEE Fre quency Con trol Sympo sium only and will ex pire on 6 May 2003.

Con ti nen tal Air lines
Ref er ence #UDBJMR
Ticket des ig na tor Code ZW81

United Air lines
Ref er ence #KR7MTGN
Ref er ence ID 500TS

Avis Rental Car Com pany
A606098

We strongly encourage you to take advantage of these codes. If you ar range travel with the IEEE Travel Team, they au to mat i cally han dle the dis count op por tu nity. If you book on your own, or through an other agency, please use these spe cial codes for sav ings.

Travel ar range ments us ing the ne go ti ated air car ri ers or the car ri ers of your choice can be made through IEEE Global Travel Ser vices by call ing be tween the hours of 8:30 a.m. and 5:00 p.m. EST. Mon day through Fri day. Within the US and Can ada, call +1 800 TRY IEEE, (+1 800 879 4333); and out side of the US and Canada, call +1 732 562 5387. Or, you may visit our on-line travel ser vice web site at http://www.ieeetravelonline.org. This se cure site of fers sim ple and con ve nient ser vice through which you can search, reserve, and ticket your travel anytime, anywhere. Or, you can e-mail your re quest to travel-team@ieee.org.

You may also fax your re quire ments to the IEEE Global Travel Ser vices at +1 732 562 8815. When faxing, please be sure to in clude your travel dates, de par ture, and re turn times, and phone and fax num bers. A Travel Coun selor will con tact you promptly.

HotelReservations

The Tampa Marriott Wa ter side is lo cated at 700 South Florida Ave, Tampa Florida. The eas i est way to re serve rooms is on the hotel website: http://www.marriott.com/tpamc. Click on Re serve a Room (up per left mar gin) and en ter the ap pro pri ate dates and Group Code (de fined be low). You may also call the ho tel at 813-221-4900 to make your res er va tion. *Res er va tions must be made with the ho tel di rectly in or der to get the dis counted group rate. Be sure to men tion you are at tend ing the "IEEE Meet ing".* **The Group Code is: "IEEIEEA".** Note that the re duced group room rate ($149 USD per night) is avail able for three days be fore and af ter the Sym po sium. Ar range ments have been made with the ho tel to of fer a lim ited num ber of rooms at a re duced rate ($133.50 USD per night) to U.S. Gov ern ment em ploy ees only.. **The Group Code for government rooms is: "IEGIEGA".** Gov ern ment ID and/or gov ern ment travel or ders must be presented at time of check-in to qual ify for these rates. The gov ernment rooms are be ing of fered on a first-come first-served ba sis to U.S. gov ern ment em ploy ees

All res er va tions must be made by 4 April, 2003. Any reser va tions made af ter this cut-off date will only be hon ored on a space avail able ba sis. Check in time at the Marriott Wa ter side is 4:00 p.m. and check out time is 12:00 Noon. In di vid ual reser va tions may be cancelled with out pen alty by 6 pm of the sched uled day of arrival.

Park ing at the Ho tel

Park ing at the ho tel is $11.20 per day. There is mu nic i pal parking avail able at rates which vary from day to day.

TutorialSessionInformation

This year the Tu to ri als will be held on Sunday, May 4th from 8:00AM until 5:00PM. Our tu to rial lead ers have been selected from among the best ex perts in the world. The tu to rial

presentations are designed for newcomers to the field, as well as con tain ing state-of-the-art ma te rial for ex pe ri enced prac ti tio ners de sir ing to keep up-to-date. We look for ward to your par tici pa tion.

Dr. John Prestage
Tu to rials Chair
Jet Pro pul sion Lab o ra tory

A sin gle reg is tra tion fee will al low at ten dees to par tici pate in the Tu to ri als, in all of the ses sions, and in cludes lunch as well as morn ing and af ter noon re fresh ment breaks, and a CD con tain ing cop ies of the tu to rial pre sen ta tions. The ad vanced reg is tra tion fee for IEEE/PDA mem bers is $200, if re ceived no later than 18 April, and $225 for on-site reg is tra tion. The ad vanced reg is tra tion fee for non-mem bers is $200, if re ceived no later than 18 April and $225 for on-site reg is tra tion. All reg is tra tion fees **MUST BE PAID IN US DOL LARS**. In or der to re ceive the re duced rate, you must sub mit your pay ment with your reg istration form. The reg is tra tion fee for FULL-TIME stu dents and FULL-TIME re tir ees is $50. A lim ited num ber of ad di tional cop ies of the in struc tional ma te rial (CD only) will be avail able at a cost of $75 at the reg is tra tion desk.

Start ing this year, the at ten dance at each tu to rial will be rec og nized with Con tin u ous Ed u ca tion Units (CEUs) to help main tain the Pro fes sional En gi neer (PE) Li cense.

Tu to ri als on the Web

The slides from last year's tutorial presentations may be viewed on the UFFC website. This year's tutorials are expected to be even better.

2003 Tutorial Briefs

In tro duc tion to Time and Fre quency Trans fer

—T.E. Parker, Na tional In sti tute of Stan dards and Tech nol ogy (NIST), USA

This tu to rial will pro vide an in tro duc tion to the tech nol ogy of time and frequency transfer. Users of time and frequency range from the ca sual user who sim ply wants to set his/her watch to the near est min ute to high pre ci sion nav i ga tion and telecommunication us ers where nano sec onds are im por tant. Con se quently there are a wide range of ser vices that are provided. The first part of the tu to rial will be a brief in tro duc tion to what time and fre quency ref er ences are avail able and to the statistical techniques used to quantify time and frequency transfer instabilities and uncertainties. Next, the range of trans fer ser vices will be sur veyed. The tech niques dis cussed will in clude, Internet time ser vices, tele phone dial up ser vices, earth based ra dio broad casts, one way time trans fer us ing the Global Po si tion ing Sys tem (GPS), com mon-view GPS, carrier-phase GPS, and Two-Way Sat el lite Time and Fre quency Transfer (TWSTFT). The basic con cepts of each tech nique will be pre sented along with typ i cal per for mance char ac ter istics. The sources of instability and error will be reviewed. Internet, tele phone, and ra dio broad casts make up what can be con sid ered low pre ci sion ser vices where the best ac cu racy that can be achieved may range from a sec ond to tens of mi cro seconds. The GPS based ser vices and TWSTFT can be con sidered high pre ci sion ser vices where ac cu ra cies rang ing from hundreds of nanoseconds to nearly a nanosecond can be achieved. Ul ti mately, the per for mance at tained may de pend strongly on the qual ity of the us ers lo cal clock.

Thomas E. Parker re ceived his B.S. in Phys ics from Al legheny Col lege in 1967. He re ceived his M.S. in 1969 and his Ph.D. in 1973, both in Physics, from Purdue University. In Au gust 1973, Dr. Parker joined the Pro fes sional Staff of the Raytheon Research Division, Lexington, Massachusetts, USA. At Raytheon Dr. Parker con trib uted to the de vel op ment of high per for mance sur face acous tic wave (SAW) os cil la tor tech nol ogy, in clud ing the "All Quartz Pack age" for SAW devices. His pri mary in ter est was fre quency sta bil ity, with an em pha sis on 1/f noise, vi bra tion sen si tiv ity, and long-term frequency sta bil ity. In June of 1994 Dr. Parker joined the Time and Fre quency Di vi sion of the Na tional In sti tute of Stan dards and Tech nol ogy (NIST) in Boul der, Col o rado, USA. He is the leader of the Atomic Fre quency Stan dards Group and his in ter ests in clude pri mary fre quency stan dards, time scales, and time/fre quency trans fer tech nol ogy. Dr. Parker is a Fel low of the IEEE.

In tro duc tion to Quartz Fre quency Stan dards

—J. R. Vig, US Army CECOM, USA

The sub ject of quartz fre quency stan dards will be re viewed. Em pha sis will be on those as pects, which are of great est in terest to users (as opposed to designers). The discussion will in clude:

- crys tal res o na tor and os cil la tor ba sics;
- the char ac ter is tics and lim i ta tions of tem per a ture compensated crystal oscillators (TCXOs) and oven con trolled crys tal os cil la tors (OCXOs);
- os cil la tor in sta bil i ties: ag ing; noise;
- the ef fects on fre quency sta bil ity of: tem per a ture, ac cel eration, radiation, warm-up, pres sure, mag netic field, and the os cil la tor cir cuitry;
- guidelines for oscillator comparison, selection and specification.

A pre view of this tu to rial can be found on the web at: http://www.ieee-uffc.org/fc

John R. Vig holds 53 pat ents and has authored more than 100 publications and book chapters. He is a Fellow of the IEEE, and was the re cip i ent of the 1990 IEEE Cady Award for outstanding contributions to the development of improved

quartz crystals and processing techniques, significantly advancing the field of precision frequency control and timing. He was the Distinguished Lecturer of the IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society (UFFC-S) for 1992-93, and he was president of the IEEE UFFC-S in 1998-99. He was awarded the IEEE UFFC-S's highest award, the UFFC-S Achievement Award, in 2000. Currently, he serves on the Board of Directors of the IEEE. In his day job, he leads a frequency control research program in the US Army Communications-Electronics Command.

PLL (Phase Lock Loops)

—M. Underhill, Philips Research Laboratories, UK

Frequency synthesis and modulation are the two main applications of the PLL. For frequency synthesis the stability and low noise of a fixed frequency reference is optimally transferred to a variable voltage controlled oscillator (VCO). The PLL can also be used to filter and demodulate FM and PM, and also to extract a carrier (or clock) for synchronous AM and data demodulation.

In all applications the best choice of loop bandwidth and loop time response has to be made. In the synthesizer the bandwidth determines how much the VCO phase noise and the reference frequency 'spurs' from the phase comparator may be reduced. In a demodulator the loop bandwidth is a compromise between fast acquisition of lock and clock extraction capability.

The design of a PLL is a compromise between reference noise VCO noise, phase comparator noise and 'spurs', loop type, loop time response and settling time. Simple design principles and 'rules' for optimum designs will be presented. A modified Leeson's model is used for the oscillator phase noise spectra and the importance of phase comparator noise reduction is stressed.

The design principles and rules will be illustrated by a (novel?) PLL Analytic System Simulator (PASS) written in Mathcad. For any PLL the PASS presents the loop root locus plot, loop transfer function as a Bode Plot, loop time response, and the filtering effect of the appropriate closed loop transfer functions on phase comparator noise and VCO noise. It responds to parameter changes in about 1 second.

Total Time Jitter is now becoming an issue for sources used in systems. Underdevelopment in the PASS is an integral algorithm, for calculating the (cycle-to-cycle) Total Time Jitter on the (VCO) output of PLL, as modified by whatever loop design parameters have been selected. Some comments on definitions for total PLL time jitter will be included.

Mike Underhill spent 24 years at Philips Research Laboratories 1960-1984 first as a research engineer and finally as Head of Systems Division. He then joined MEL the Defense and Medical part of Philips UK as Technical Director for 6 years. In 1991 he was Engineering Director of Thorn-EMI Sensors division after Thorn-EMI take-over of MEL, Mike then became a full-time academic at the University of Surrey in 1992. After a five year term as Head of Electronic and Electrical Engineering Department and Dean of Engineering he refocused on Antenna Research (small antennas and phased arrays) and research into noise and Jitter Suppression Technology, the AJC, low noise PLLs etc. A University spin-out company 'Toric Limited' has been formed to exploit the Jitter Suppression technology; Mike is Chairman and Technical Director. Although now part-time at the University of Surrey he still teaches RF circuits and systems and antennas. As short course activities he also teaches Radar, Sensor Fusion, and MMIC oscillators.

In the early '80s Mike led the team that produced the first Philips professional quality frequency synthesis chips, the HEF 4750 and 4751, soon to be followed by the SAA1057. These chips have lasted longer in the Philips catalogue than any other LSI designs.

Wireless Passive SAW Identification Marks and Sensors

—L.M. Reindl, Clausthal University of Technology, Germany

In the recent years wireless SAW sensors and identification tags have come under notice with a growing number of publications and applications. In this tutorial the operating principles of wireless passive SAW based identification marks and sensors are reviewed.

The whole radio sensor system consists of a read-out unit, comparable to an RADAR device, and a passive transponder, consisting of a surface acoustic wave (SAW) device wired to an antenna. The surface acoustic wave stores the read-out signal for a predefined period of time to suppress all environmental echo interferences. Physical or chemical effects may influence the propagation characteristics of the surface acoustic wave. Two fundamental devices allow storing and modulating of surface acoustic waves: the resonator, and the uniform or chirped delay line.

In this tutorial, the transponder setup using a reflective delay line, resonator, or impedance sensor is discussed in detail, as well as the setup of the read out unit using a pulse or FMCW radar. Special emphasis is set on the achievable accuracy and on the sensitivity range. Several applications of such sensor systems and their state-of-the-art performance is presented by way of examples which include identification marks and wireless measurements of temperature, pressure, torque, acceleration, tire-road friction, magnetic field, and water content of soil. A discussion of other resonant structures which also could be used in a passive transponder system will close the tutorial.

Leonhard Reindl received his Diploma in Physics from Technical University of Munich, Germany, in 1985 and his Dr. sc. techn. from University of Technology Vienna, Austria, in 1997. In April 1985 Dr. Reindl joined the surface acoustic wave group of the Siemens Corporate Technology Division, Munich, Germany. At Siemens Dr. Reindl contributed to the development of SAW convolvers, dispersive, tapped, and reflective delay lines. His primary interest was in the development and application of SAW ID-tag and wireless passive SAW sensor systems. In April 1999 Dr. Reindl joined the Institute of Electrical Information Technology, Clausthal University of Technology, where he became professor of communications and microwave techniques. He holds 30 patents on SAW devices and wireless passive sensors and has authored or co-authored more than 100 papers in this field. He is member of the IEEE.

Pas sive Atomic Fre quency Stan dards

—L. Cut ler, Agilent Lab o ra to ries, USA

This tu to rial will cover much of the ba sic phys ics and elec-tron ics of pas sive atomic fre quency stan dards. Par tic u lar at-tention will be paid to the design aspects that affect the ac cu racy and fre quency sta bil ity of the stan dards and ways to op ti mize the per for mance. The ce sium atomic beam stan dard will be treated in the most de tail.

Leon ard S. Cut ler re ceived the PhD de gree in the o ret i cal physics from Stanford University in 1966. He has been heavily in volved in the the ory and de sign of atomic fre quency standards and precision quartz oscillators since 1957. His present position is Distinguished Contributor, Technical Staff, Agilent Lab o ra to ries.

Low Noise Os cil la tor De sign and Per for mance

—M. Driscoll, Northrop Grumman Cor po ra tion

This Tu to rial will de scribe meth ods for achiev ing and ver i fy ing low phase noise in os cil la tors op er at ing in the HF through mi cro-wave fre quency bands. A com par i son of os cil la tor sta bi li za tion el e ments will be dis cussed, in clud ing acous tic, co ax ial, and di-elec tric res o na tors. Also in cluded will be a de scrip tion of re cently de vel oped feed back and feed-for ward tech niques for de tec tion and re duc tion of os cil la tor sus tain ing stage am pli fier near-car rier noise. Tu to rial top ics will in clude: Fre quency Sta bil ity Mea sures and Mea sure ment, Ba sic Os cil la tor Op er a tion, Types of Res o na-tors, Use ful Net work Trans for ma tions, Sus tain ing Stage De sign, En vi ron men tal Stress Ef fects, Lin ear Fre quency Tun ing, Cir cuit Sim u la tion & Noise Mod el ing, Test/Trou ble shoot ing Meth ods, and Noise De-cor re la tion and Re duc tion Tech niques.

Mi chael M. Driscoll (M'80-SM'86-F-'91) is a Se nior Con sult ing En gi neer in the Sig nal Gen er a tion and Re ceive Sys tems Group at the Northrop Grumman Elec tronic Sys-tems fa cil ity in Bal ti more, MD. He is cur rently di rect ing and con duct ing re search aimed at the de vel op ment of low noise sig nal gen er a tion hard ware, pri mar ily in tended for use in ra dar sys tems. His work in cludes de sign and de vel-opment of ul tra-low noise RF sig nal pro cess ing com po-nents, especially oscillators using bulk acoustic wave, sur face acous tic wave, and cooled sap phire di elec tric res-onator technologies.

Mike received his BSEE degree at the University of Mas sa chu setts in 1965, when he be gan work at the West-inghouse Defense and Space Center in Baltimore (now Northrop Grumman). He has been a mem ber of the IEEE Fre quency Con trol Sym po sium Tech ni cal Pro gram Com-mittee since 1987, and he is an associate editor for the IEEE Trans ac tions on UFFC. In 1997, he was the re cip i ent of the IEEE UFFC So ci ety's Cady Award for "out stand ing con tri bu tions in the de vel op ment of low noise sig nal gen-er a tion tech nol ogy". He holds 16 U.S. and for eign pat ents and is the au thor of over 70 tech ni cal pa pers ap pear ing in IEEE jour nals and Sym po sia pro ceed ings.

PM and AM Noise Mea sure ment Tech niques - I

—E. Ferre-Pikal, Uni ver sity of Wy o ming, USA

Part I de scribes the fun da men tal con cepts and def i ni tions used in both PM and AM noise metrology. Simple PM and AM noise mea sure ment sys tems are de scribed and an a lyzed. The effects of frequency translation and multiplication on the spec tral pu rity are ex am ined. Sim ple noise mod els for os cil la-tors, mix ers, and am pli fi ers are dis cussed.

Eva S. Ferre-Pikal re ceived her B.S. de gree in elec tri cal en gi neer ing from the Uni ver sity of Puerto Rico, Mayaguez, in 1988. In 1989, she re ceived her M.S. de gree in elec tri cal en gi-neer ing from the Uni ver sity of Mich i gan, Ann Ar bor. From 1988 to 1991 she worked for AT&T Bell Laboratories in Westminster, CO. She received her Ph.D. degree from the Uni ver sity of Col o rado at Boul der in 1996. The main topic of her the sis was the up-con ver sion of low fre quency noise into phase and am pli tude noise in BJT am pli fi ers.

From 1997 to 1998 she was a Na tional Re search Coun cil Post doc toral Re search As so ci ate at the Na tional In sti tute of Stan dards and Tech nol ogy. In 1998 she joined the Elec tri cal En gi neer ing De part ment at the Uni ver sity of Wy o ming as an as sis tant pro fes sor. Her re search in ter ests are phase and am-pli tude noise pro cesses in os cil la tors and am pli fi ers, the gen-eration and synthesis of frequency stable signals, and the de sign and ap pli ca tions of low noise de vices.

PM and AM Noise Mea sure ment Tech niques - II

—C. Nel son, NIST

Part II de scribes the prac ti cal as pects of phase and am pli tude noise mea sure ments. Ba sic mea sure ments as well as ad vanced mea sure ment tech niques will be dis cussed. The use of PM and AM noise standards and wide-band modulators for system cal i bra tion is dis cussed. Two chan nel sys tems for AM and PM noise mea sure ments that have noise floors ap proach ing -195 dBc/Hz will be de scribed.

Craig Nel son re ceived his BSEE from the Uni ver sity of Col o rado in Boul der in 1990. Af ter work ing in the op ti cal disk mar ket and co-found ing SpectraDynamics, he joined the staff at the Time and Fre quency Di vi sion of the Na tional In sti tute of Stan dards and Tech nol ogy. He has worked on syn the sis and con trol elec tron ics, as well as soft ware for both the NIST-7 and F1 pri mary fre quency stan dards. He is pres ently in volved in re search and de vel op ment of ul tra-sta ble syn the siz ers, low phase noise elec tron ics, and phase noise me trol ogy. Cur rent ar eas of re search in clude high-speed pulsed phase noise mea-sure ments and phase noise me trol ogy in the 100 GHz range. He has pub lished over 20 pa pers and fre quently pres ents tu to-ri als on the prac ti cal as pects of high-res o lu tion phase noise metrology.

Time Scales

—P. Tavella, Istituto Elettrotecnico Nazionale, It aly

Time Scales: keep ing time and the new most de mand ing ap-pli ca tions. The tu to rial will deal with the def i ni tion and re al-iza tion of a time scale as a sys tem for timekeeping, but also it will con sider the new de mand ing ap pli ca tions such as sat el lite sys tems and tele com mu ni ca tion net works where the math e-mat i cal model of the clock er rors and their sta tis tics are fun da-mental in for ma tion.

Patrizia Tavella, de gree in Phys ics and Ph.D. in Me trol-ogy, is now with the Istituto Elettrotecnico Nazionale, Torino, It aly in the Time Me trol ogy Dept. Her main in ter ests

are mathematical and statistical models mostly applied to atomic time scale al go rithms and to the un cer tainty eval u a-tion of atomic clock mea sure ments. She is in volved in the Eu ro pean pro ject Ga li leo for the de vel op ment of a sat el lite nav i ga tion sys tem and she chairs the CCTF WGs on TAI and on Al go rithms.

The Ba sics of Sta tis ti cal Pro cesses and Time and Fre quency

—Vic tor S. Reinhardt, Boe ing Sat el lite Sys tems

Most text books on sta tis ti cal pro cess em pha size com mu ni ca-tions theory and sta tion ary pro cesses and do not say much about the non-sta tion ary pro cesses that are most im por tant to time and fre quency. This tu to rial will at tempt to fill that gap. It will cover the ba sics of sta tis ti cal pro cesses, but will em pha-size ar eas that are im por tance to time and fre quency.

First, the basics of statistical processes will be covered, start ing from the con cept of a ran dom vari able. Con cepts such as stationarity, ergodicity, cor re la tion, and spec tral den si ties will be dis cussed and the im por tant dis tinc tion be tween en-sem ble and time av er ag ing will be made.

Sec ond, the ba sic con cepts used in time and fre quency, such as near pe ri od ic ity, am pli tude, phase, and fre quency er ror will be in tro duced and used to il lus trate the sta tis ti cal con cepts.

Third, linear transformations (filtering) of random vari-ables will be dis cussed, and fun da men tal the o rems re lat ing the statistical properties of transformed variables will be pre-sented. Ap pli ca tions of these the o rems will be dem on strated us ing time and fre quency ex am ples. Graph i cal tech niques will be in tro duced that aid in the un der stand ing of sys tem er rors and dem on strate that both the stan dard and Alan vari ance can be de scribed as a vari ance of a fil tered sys tem vari able.

Fourth, non-sta tion ary pro cesses that give rise to ran dom walk and flicker noise will be treated. Phys i cal mod els will be given to graph i cally dem on strate how these pro cesses arise, and tech niques will be de scribed which turn these non-sta tion-ary pro cesses into the lim its of sta tion ary pro cesses.

Fi nally, os cil la tor noise will be dis cussed. A graph i cal der i-va tion of Leeson's equa tion will be given, show ing how the feed back in her ent in an os cil la tor gives rise to ran dom walk and flicker of fre quency noise. The im por tance of res o na tor Q in this feed back pro cess will also be dis cussed.

Vic tor S. Reinhardt (M'77) re ceived the B.A. de gree in phys ics from New York Uni ver sity, New York, NY, in 1967, and re ceived the M.A. and Ph.D. de grees in phys ics from Har-vard Uni ver sity in 1968 and 1974 re spec tively. Fol low ing his Ph. D., Dr. Reinhardt was awarded a Na tional Acad emy of Sciences research associateship at NASA, Goddard Space Flight Cen ter in Greenbelt, Mary land. In 1975, he be came a per ma nent em ployee of Goddard, where he ul ti mately be came re spon si ble for their atomic fre quency stan dards pro gram. In 1982, he left Goddard to work as a Se nior Sci en tist for the Bendix Field En gi neer ing Cor po ra tion in Co lum bia, Mary-land, where he worked in ar eas rang ing from pre cise time and fre quency to far in fra red op tics. In 1984, Dr. Reinhardt joined the Hughes Aircraft Space and Communications Group, which be came part of Boe ing Sat el lite Sys tems in 2000, and he is cur rently a Chief Sci en tist at BSS. His ac tiv i ties there in-clude work in high speed dig i tal com mu ni ca tions, dig i tal sig-nal processing, frequency generation and synthesis, atomic fre quency stan dards, phased ar ray and adap tive an ten nas, and mmwave elec tron ics.

Dr. Reinhardt's pro fes sional ac tiv i ties in clude be ing a past chair man of the Wash ing ton, DC, IEEE I&M Sec tion and a current member of the IEEE I&M Transactions Editorial Com mit tee. He is also a mem ber NASA/DOD Pre cise Time and Time Interval Industrial Advisory Board and the IEEE Fre quency Con trol Sym po sium Tech ni cal Com mit tee. He has 19 pat ents and has authored nu mer ous pa pers in the ar eas of pre cise time and fre quency, dig i tal com mu ni ca tions and sig-nal processing, and phased array antennas. In 1994, Dr. Reinhardt received the Hughes Telecommunications and Space Pat ent Award, and in 2002 Dr. Reinhardt was hon ored by be ing ap pointed as a Boe ing Tech ni cal Fel low.

Dig i tal Mea sure ment of Pre ci sion Os cil la tors

—S.R. Stein, Tim ing So lu tions Cor po ra tion, USA

This tu to rial re views the sub ject of dig i tal mea sure ments of clocks and os cil la tors. It fo cuses pri mar ily on the pre ci sion mea sure ment of phase and the use of these mea sure ments in es ti mat ing phase and fre quency and com mon sta tis tics such as the Allan de vi a tion and the spec tral den sity of phase. The sub-ject mat ter in cludes di rect count ing, in ter po lat ing coun ters, di-viders, heterodyne conversion, and dual-mixer systems. Bi ases in the mea sure ments caused by aliasing and mea sure-ment quantization are evaluated. An a log tech niques, which are used pri mar ily to eval u ate phase noise, are cov ered in a re-lated tu to rial.

Sam uel R. Stein is founder and Pres i dent of Tim ing So lu-tions Cor po ra tion, a com pany that spe cial izes in real-time ap-plications and that provides timing systems to National Lab o ra to ries, DoD pro grams such as GPS, and Gov ern ment Prime Con trac tors. He has de vel oped ul tra high pre ci sion time measurement, gen er a tion and dis tri bu tion sys tems and is an in ter na tion ally rec og nized leader in time and fre quency mea-sure ment meth ods and the ensembling of clocks. He was pre-viously Technical Director at Ball Corporation (Efratom Di vi sion) and Time and Fre quency Di vi sion Chief at the Na-tional Bu reau of Stan dards (NIST). Dr. Stein has more than 48 pub li ca tions and eight pat ents.

Tech niques for Fre quency Sta bil ity Anal y sis

— W.J. Riley, Symmetricom, Inc., USA

This tu to rial will de scribe prac ti cal tech niques for time-do-main fre quency sta bil ity anal y sis, us ing case stud ies and ex-amples to illustrate the methods commonly employed to char ac ter ize pre ci sion clocks and os cil la tors.

Sta bil ity anal y sis be gins with the col lec tion of phase or fre-quency data, gen er ally sam pled at equal mea sure ment in ter-vals, pref er a bly with time tags. These data are then pro cessed, typ i cally con vert ing from phase to fre quency, check ing for out li ers, re mov ing drift, and then per form ing a sta bil ity anal y-sis. Vi sual ex am i na tion of the phase and fre quency data is an im por tant tool. The over all ob jec tive should be to pro vide in-sight, not just num bers.

Op tions ex ist for all of these steps, and it is the re spon si bil ity of the analyst to make reasonable choices in order to obtain mean ing ful re sults. The raw data must have ad e quate res o lu tion, and be free of con tam i na tion from un wanted en vi ron men tal sen sitivity. Missing points, jumps, outliers, and other anomalies must be dealt with, pref er a bly us ing meth ods of ro bust sta tis tics. A suit able drift model must be se lected, and an ap pro pri ate sta bil ity mea sure must be cho sen based on the de vice un der test and the ob jec tive of the anal y sis. Sev eral new sta tis tics are avail able (e.g. Hadamard, To tal and Thêo1 vari ances), and the an a lyst needs to un der stand their prop er ties and ap pli ca tions, in clud ing such de tails as bias and con fi dence in ter vals, which may re quire that the dom i nant noise mech a nism be cor rectly iden ti fied.

Other tools avail able to the an a lyst in clude spec tral anal y sis, exam i nation of the am pli tude dis tribution, do main con version, and simulation. There are several techniques for spectral anal y sis, where is sues of bias and smooth ing ex ist, and which can pro vide in for ma tion about the noise pro cess as well as dis crete com po nents. Sim u la tion of clock noise, per haps with time and fre quency off set, and fre quency drift, can be a pow er ful tool for pre dict ing per for mance and gain ing in sight into clock be hav ior.

Fi nally, is sues re gard ing stan dard iza tion, au to ma tion, con sis tency, pre sen ta tion, and re port ing can af fect the qual ity of the re sults.

The tu to rial will il lus trate these, and other, sub jects with ex am ples of ac tual sta bil ity anal y ses.

William J. Riley joined Symmetricom (then Frequency and Time Sys tems, and later Da tum) in 1999 as Man ager of Ru bid ium Tech nol ogy. As a key mem ber of the Re search De part ment, he ap plies his ex ten sive ex pe ri ence with ru bid ium frequency standards to those products within the Symmetricom organization.

From 1980 to 1998, Mr. Riley was the En gi neer ing Man ager of the Ru bid ium De part ment at EG&G. His ma jor re spon si bil ity was to di rect the de sign of ru bid ium fre quency stan dards and re lated prod ucts. This work in cluded high per for mance ru bid ium clocks for the GPS pro gram, and a line of min ia ture com mer cial and mil i ta rized ru bid ium fre quency stan dards.

Mr. Riley is also the pro pri etor of Ham il ton Tech ni cal Ser vices, where he de vel ops and sells the Stable32 pro gram for frequency sta bil ity anal y sis. Mr. Riley re ceived a BSEE de gree from Cornell University in 1962 and a MSEE degree from North east ern Uni ver sity in 1966. He holds four pat ents in the area of fre quency con trol, and has pub lished a num ber of pa pers and ar ti cles in that field. He is a Fel low of the IEEE, and is a mem ber of Eta Kappa Nu, the IEEE Ultrasonics, Ferro elec trics and Fre quency Con trol So ci ety, and the Pre cise Time and Time In ter val Ad vi sory Board. Mr. Riley was awarded the I.I. Rabi Award in 2000.

Symposium Registration Information

Registration Fees

Each Symposium participant must register and receive a badge. The badge must be worn to gain ad mis sion to the tech ni cal ses sions and the ex hibit area. You will save time and money by reg is ter ing in ad vance.

IEEE/PDA Mem ber Fees

The ad vanced reg is tra tion fee for IEEE mem bers or em ployees of PDA mem ber com pa nies is $425, with Pro ceed ings on CD, and $575, with pa per Pro ceed ings, for reg is tra tions received NO LATER THAN 18 April 2003. Af ter 18 April, the reg is tra tion fee for IEEE/PDA Mem bers is $475, with Pro ceed ings on CD and $625 with pa per Pro ceed ings.

Non-Mem ber Fees

The advanced registration fee for Non-Members, received prior to 18 April 2003, is $450, with Pro ceed ings on CD, and $600, with pa per Pro ceed ings. Af ter 18 April, the reg is tra tion fee for Non-Members with Pro ceed ings on CD is $500 and $650 with pa per Pro ceed ings.

In or der for at ten dees to re ceive the re duced rate for ad vanced reg is tra tion, pay ment must be sub mit ted with the ad vanced registration form. The registration fee entitles the reg is trant to ad mis sion to the tech ni cal ses sions (but not the Tu to ri als), the ex hib its, the re fresh ment breaks, two lunches, (Mon day and Tues day, 5 & 6 May) the Wel com ing Re cep tion, the Ex hib i tor's Re cep tion, the Ban quet and a CD con tain ing the Proceedings of the Symposium. There is an additional charge of $150 for a pa per copy of the Pro ceed ings. Pro ceed ings, whether on CD or pa per, will be mailed to at ten dees a few months af ter the Sym po sium.

One Day Reg is tra tion

In ad di tion, those in di vid u als who wish to reg is ter for one day only may do so for a fee of $240. Lunch is avail able for $30 per day. Ad mis sion to the ban quet is avail able for $55. Pro ceed ings on CD are avail able for $100.

Stu dent Fees

The reg is tra tion fee for FULL-TIME stu dents is $75; this in cludes lunch for two days. Ad mis sion to the ban quet is avail able for $55. Pro ceed ings are avail able on CD for $50

Re tiree Fees

The reg is tra tion fee for FULL-TIME re tir ees is $75; this in cludes lunch for two days. Ad mis sion to the ban quet is avail able for $55. Pro ceed ings are avail able on CD for $100.

Life Mem bers

IEEE Life Mem bers may reg is ter at no charge. Lunch is avail able for $30 per day. Ad mis sion to the ban quet is avail able for $55. Pro ceed ings are avail able on CD for $100.

The advanced registration form for the Symposium and Tu to ri als is lo cated on line at:

http://www.ieee-uffc.org/freqcontrol/2003FCS/2003_on line_reg.htm. You may photocopy this form for use by ad di tional reg is trants. Visa, MasterCard and Amer i can Ex press will be ac cepted. Credit card reg is tra tions ONLY can be faxed to 1.732.681.9314 or e-mailed to: mcgivneyb2@aol.com. Reg is tra tions with pay ments by check can be mailed to the ad dress shown on the form. Your badge, along with receipt for fees

paid, can be picked up at the Symposium registration desk. Con fir ma tions will NOT be sent un less re quested.

The reg is tra tion fee is fully re fund able up to five busi ness days be fore the Sym po sium/Tu to ri als. Af ter that date, there will be a ser vice charge of $50. Re funds will not, how ever, be is sued once the Sym po sium and/or Tu to rial be gins. At ten dee sub sti tu tions may be made at any time.

Guest Registration

There will be a no-cost Guest Registration this year at the Sym po sium. A list of reg is tered guests will be avail able so that guests may co or di nate day time ac tiv i ties of mu tual in ter est. Reg is tered guests will re ceive a name badge. Ad mit tance to the Wel com ing Re cep tion and the Ex hib i tor's re cep tion is included for registered guests. Admission to the banquet is available for $55. It would be most help ful (to preprint the name badges) if guests pre-reg is tered us ing the en closed registration form.

Registration Desk Hours

The Reg is tra tion Desk for the Sym po sium will be open dur ing the fol low ing hours:
Sunday, May 4 from 3-5PM and 7-9PM
Mon day, May 5th from 7:30AM - 5:00PM
Tues day, May 6th from 7:30AM - 5:00PM
Wednes day, May 7th from 7:30AM - 5:00PM
Thurs day, May 8 from 7:30 AM - Noon.
The Registration Desk hours for the Tutorial will be from 7:30AM - 5:00PM on Sunday, May 4th.

Messages

Ur gent mes sages may be left by call ing the Marriott Wa ter side Ho tel at 813 221 4900 and ask ing to be trans ferred to the Conference Reg is tra tion Desk in "Of fice #1"

Pre-registration Form

Pre-reg is tra tion form may be found on line at:
http://www.ieee-uffc.org/freqcontrol/2003FCS/2003_online_reg.htm

Symposium Organizing Committee

Gen eral Chair
R. Mi chael Garvey, Symmetricom TRC
rmgarvey@symmetricom.com

Ray mond Besson, Laboratoire de Chronometrie Electronique
Piezoelectricité
rbesson@ens2m.fr.

Tech ni cal Pro gram Chair
Pi erre Thomann, Observatoire de Neuchâtel
pi erre.thomann@ne.ch

U. S. Li ai son for the Tech ni cal Pro gram
Chris to pher Ekstrom, United States Na val Ob ser va tory
ekstrom@atom.usno.navy.mil

Tu to rial Chair
John D. Prestage, Jet Pro pul sion Lab o ra tory
John.D.Prestage@jpl.nasa.gov

Ex hib its Chair
Tom Jones. CCI/USA
CCIUSA@cyberstreet.com

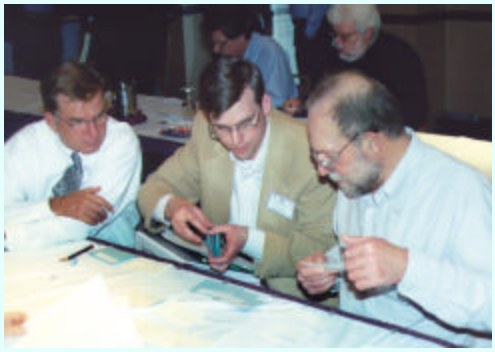
Fi nance Chair
Ray mond L. Filler, U.S. Army CECOM RDEC
ray mond.filler@mail1.monmouth.army.mil

Editorial-Chair
John R. Vig, U.S. Army CECOM
j.vig@ieee.org

Awards Co-Chair
Fre quency Con trol
Thomas E. Parker, National Institute of Science and Technology
tparker@boul der.nist.gov
mailto:raymond.filler@mail1.monmouth.army.mil

Eu ro pean Fre quency and Time Fo rum
Ray mond Besson, Laboratoire de Chronometrie Electronique
Piezoelectricité
rbesson@ens2m.fr

Piezoelectric Devices Association
Marcie Staudte, Xeco Inc.
staudte@netutah.com



Let's get these pa pers sorted (left to right) Jesse Searles, War ren Walls, and Gary Montress.

Tom Parker mak ing sure the ses sion pa pers are in the right order.

We're asleep on our feet, but we ARE lis ten ing, Bob. Left to right: Dan Stevens, Marv Frerking, and Bob Smythe.

Break time! Pi erre Thomann (cen ter) and Rob ert Lutwak.

We're still smil ing. Steve Jefferts (left) and Marco Siccardi.

Gary Montress says 320 ab stracts are my limit!

I'm lik ing the snow says Bernardo Jaduszliwer.

Ber nard Dulmet(right) mak ing a point to John Vig (left) and Fabien Josse.

We are lis ten ing, hon est! (left to right) Rob ert Lutwak, Gary John son, Steve Jefferts, Marco Siccardi.

2003 Technical Program Committee

TPC Chair:	**Pi erre Thomann**	**Pierre.Thomann@ne.ch**
TPC U.S. Li ai son	**Chris Ekstrom**	**ekstrom@atom.usno.navy.mil**
Group 1 Vice- Chair:	**Gary John son**	**g.johnson@ieee.org**
Group 2 Vice- Chair:	**Mi chael Driscoll**	**mmdriscoll@northropgrumman.com**
Group 3 Vice- Chair:	**Bob Tjoelker**	**Robert.Tjoelker@jpl.nasa.gov**
Group 4 Vice- Chair:	**Ryszard Lec**	**r.lec@coe.drexel.edu**
Group 5 Vice- Chair:	**Butch Tysinger**	**butch_tysinger@agilent.com**

IEEE FREQUENCY CONTROL SYMPOSIUM TECHNICAL PROGRAM COMMITTEE

Ivan Avramov
In sti tute of Solid State Phys ics BUL GARIA

Ar thur Ballato
U.S. Army CECOM RDEC USA

Ewald Benes
Vi enna Uni ver sity of Tech nol ogy AUS TRIA

Ray mond J. Besson
ENSMM - LCEP FRANCE

Mar tin Bloch
Fre quency Elec tron ics Inc. USA

Jean-Si mon Boulanger
Na tional Re search Coun cil of Can ada CAN ADA

Canon Bradley
USA

Remi Brendel
ENSMM FRANCE

Eric Burt
Jet Pro pul sion Lab o ra tory, USA

Lute Maleki
Jet Pro pul sion Lab o ra tory USA

Don ald Malocha
Uni ver sity of Cen tral Florida USA

George Mansfeld
In sti tute of Radioengineering and Elec tron ics RAS RUS SIA

Eishi Momosaki
Epson R&D, Inc. USA

Gary Montress
Raytheon Re search Di vi sion USA

Da vid Mor gan
Im pulse Con sul ting USA

Bernd Neubig
GERMANY

Shin-ichi Ohshima
Na tional In sti tute of Ad vanced In dus trial Sci ence and Tech nol ogy JA PAN

Shih S. Chuang
Statek Corp. USA

Leon ard Cut ler
Agilent Lab o ra to ries USA

Andrea DeMarchi
Politecnico di Torino IT ALY

Mi chael Driscoll
Northrop Grumman Elec tron ics Sys tems USA

Ber nard Dulmet
ENSMM - LCEP FRANCE

Errol Eernisse
Quartzdyne, Inc. USA

Chris to pher Ekstrom
U.S. Na val Ob ser va tory, USA

Jeremy K.A. Everard
Uni ver sity of York UNITED KING DOM

Eva S. Ferre-Pikal
Uni ver sity of Wy o ming USA

Ray mond Filler
US Army CECOM RDEC USA

Pe ter Fisk
CSIRO AUS TRA LIA

Marvin Frerking
In no va tive Tech nol ogy Products USA

R. Mi chael Garvey
Symmetricom, TRC USA

George J. Giansanti, Jr.
Mi cro Net works, Corp. USA

Wil liam P. Hanson
Har monic Tech nol o gies Inc, USA

Ken-ya Hashimoto
Chiba Uni ver sity JA PAN

Jackie Hines
J.H. Hines Con sul ting USA

Bernardo Jaduszliwer
The Aero space Cor po ra tion USA

Ste ven Jefferts
NIST - Na tional In sti tute of Stan dards and Tech nol ogy

Thomas Parker
NIST - Na tional In sti tute of Stan dards and Tech nol ogy USA

Guy Portnoff
Quartz Pro AB SWE DEN

John Prestage
Jet Pro pul sion Lab o ra tory USA

Leo Reindl
Institut für Elektrische Informationstechnik GER MANY

Vic tor Reinhardt
Boe ing Space Sys tems USA

Enrico Rubiola
Universite Henri Poincare FRANCE

Clem ens Ruppel
EPCOS AG GER MANY

Jesse H Searls
Po sei don Sci en tific In stru ments Pty. Ltd AUS TRA LIA

Marco Siccardi
Symmetricom TRC USA

Rob ert Smythe
Piezo Tech nol ogy Inc. USA

Sam uel Stein
Tim ing So lu tions Corp. USA

Dan Stevens
Vectron In ter na tional USA

Don ald Sullivan
NIST - Na tional In sti tute of Stan dards and Tech nol ogy USA

Pi erre Thomann
Observatoire Can tonal de Neuchâtel SWIT ZER LAND

Rob ert Tjoelker
Jet Pro pul sion Lab o ra tory USA

Mi chael Tobar
The Uni ver sity of West ern Aus tra lia AUS TRA LIA

Dmitry Tsarapkin
MPEI RUS SIA

Butch Tysinger
Agilent Tech nol o gies USA

John Vig
USA

Gary John son
Saw yer Re search Prod ucts USA

Fabien J. Josse
Marquette Uni ver sity USA

Vladi mir A. Klipov
Saw yer Re search Prod ucts, Inc. USA

Alvin Kong
TRW USA

Shigeru Kurosawa
Na tional In sti tute of Ad vanced In dus trial Sci ence and Tech-nol ogy, JA PAN

Jack Kusters
Agilent Tech nol o gies USA

Ryszard Lec
Drexel Uni ver sity USA

Ralf Lucklum
Otto-von-Guericke-Univ. GER MANY

Rob ert Lutwak
Symmetricom, TRC USA
U.S. Army Com mu ni ca tions Elec tron ics Com mand USA

Yakov L. Vorokhovsky
Morion, RUS SIA

Fred Walls
To tal Fre quency USA

War ren Walls
Femto second Sys tems, Inc. USA

Yasuaki Watanabe
To kyo Metro pol i tan Uni ver sity JA PAN

Eric T. Watts
Boe ing Nav i ga tion Sys tems USA

Jo seph White
U.S. Na val Re search Lab o ra tory USA

Debra Coler
Tech ni cal Pro gram Com mit tee Ad min is tra tor
OEwaves, Inc.

Barbara McGivney
Con fer ence Co or di na tor
Syn er gis tic Mgt. Inc.

EUROPEAN FREQUENCY AND TIME FORUM - SCIENTIFIC COMMITTEE

Jean-Pi erre Aubry
Oscilloquartz SA, SWIT ZER LAND

Claude Audoin
FRANCE

Andreas Bauch
PTB - Physikalisch-Technische Bundesanstalt GER MANY

Elio Bava
Politecnico di Milano IT ALY

Laurent-Guy Bernier
METAS - SWIT ZER LAND

Ray mond J. Besson
ENSMM - LCEP, FRANCE

Em man uel Bigler
ENSMM - LCEP, FRANCE

Jean-Si mon Boulanger
Na tional Re search Coun cil of Can ada CAN ADA

Michel Bru net
Dan iel Hauden
LPMO - CNRS FRANCE

Kurt Hilty
METAS-Of fice fédéral de Métrologie et
d'Accréditation SWIT ZER LAND

Carl K. Hruska
York Uni ver sity CAN ADA

Kalevi Kalliomäki
Uni ver sity of Oulu FIN LAND

Masami Kihara
NTT Net work In no va tion Lab o ra to ries JA PAN

Di eter Kirchner
Technische Universität Graz AUS TRIA

Pe ter W Krempl.
AVL List GmbH AUS TRIA

Sigfrido Leschiutta
Istituto Elettrotecnico Nazionale Ga li leo Ferraris IT ALY

Maleki Lute
CNES - Cen tre Na tional d'Etudes Spatiales FRANCE

Giovanni Busca
SWITERLAND

André Clairon
BNM - SYRTE - FRANCE

Gerrit De Jong
NMi Van Swinden Lab o ra tory THE NETH ER LANDS

Andrea De Marchi
Politecnico di Torino IT ALY

François Deyzac
ONERA FRANCE

Noël Dimarcq
BNM - SYRTE - FRANCE

Chris to pher Ekstrom
US Na val Ob ser va tory USA

Pekka Eskelinen
Hel sinki Uni ver sity of Tech nol ogy FIN LAND

Steve Feltham
ESA - Eu ro pean Space Agency ESTEC
THE NETH ER LANDS

R. Mi chael Garvey
Symmetricom TRC, USA

Pat rick Gill
NPL - Na tional Phys i cal Lab o ra tory UNITED KING DOM

Vin cent Giordano
CNRS - LPMO FRANCE

Aldo Godone
IEN Ga li leo Ferraris IT ALY

Michel Granveaud
BNM - SYRTE - FRANCE

Yuri Gulyaev
Rus sian Acad emy of Sci ences RUS SIA

Jörg Hahn
ESA - Eu ro pean Space Agency ESTEC
THE NETH ER LANDS

JPL - Jet Pro pul sion Lab o ra tory USA

Demetrios Matsakis
US Na val Ob ser va tory USA

Bernd W. Neubig.
GER MANY

Ro dri guez Juan Palacio
Real Instituto y Observatorio de la Ar mada SPAIN

Christophe Salomon
Ecole Nationale Supérieure FRANCE

Giorgio Santarelli
BNM - SYRTE - FRANCE

Wolfgang Schlüter
Institut für Angewandte Geodäsie GER MANY

Jörn Stenger
PTB - Physikalische-Technische Bundesanstalt
GERMANY

Don ald B.Sullivan
NIST - Na tional In sti tute of Stan dards & Tech nol ogy USA

Patrizia Tavella
Istituto Elettrotecnico Nazionale Ga li leo Ferraris IT ALY

Pi erre Thomann
Observatoire Can tonal de Neuchâtel SWIT ZER LAND

Pi erre Uhrich
BNM - SYRTE FRANCE

Adolph A Ulianov.
Kvarz In sti tute of Elec tronic Mea sure ments RUS SIA

Mi chael Underhill
Uni ver sity of Sur rey UNITED KING DOM

Rainer Unverdross
Unverdross Technik GER MANY

Jacques Vanier
CANADA

Wal ter Zingg
Rolex SA SWIT ZER LAND

Establishment of the Quartz Industries Association of Taiwan

Af ter two de cades of con tin u ous growth, Tai wan is now one of Asia most im por tant man u fac tur ing bases of desk top com-put ers, note books, TFT-LCD mon i tors, mo bile phones, ca ble modems, wireless peripherals like WLAN cards, etc. All these products need quartz crystals and oscillators for fre-quency gen er a tion and con trol. The out put of the quartz in-dus tries in Tai wan is now ranked num ber 5 in the world. In addition, with Taiwan recently achieving more than 100% mo bile sub scriber pen e tra tion rate (each per son in Tai wan has more than one mo bile phone num ber) and the ever in creas ing con tract man u fac tur ing of brand name mo bile phones in Tai-wan, SAW fil ter com pa nies are also sprout ing up.

The Quartz In dus tries As so ci a tion of Tai wan (QIAT) was for mally es tab lished on May 20th of this year in Tai pei, the cap i tal city of Tai wan. The pur pose of QIAT is to:

1. Pro vide fo rums to bring to gether the in dus tries, gov ern ment agen cies, uni ver si ties and re search or ga ni za tions so to pro mote the im por tance of the technologies
2. Link up with the in ter na tional re search in sti tutes, uni ver si ties, pro fes sional so ci eties and as so ci ations of the re lated tech nol o gies so to en hance in for ma tion and tech ni cal ex changes
3. To bring to gether the man u fac tur ers of crys tal and SAW prod ucts in Tai wan to better serve the do mes tic and international customers.

QIAT spon sored its first sem i nars on June 20th. The in vited speakers were Dr. Jun Yamada of Hitachi and Dr. Sakichi Ashida for merly of Samsung and LG. They cov ered the sub-jects "Tech nol ogy and Stan dard iza tion of Mo bile Tele com mu-ni ca tions" and "Growth and Char ac ter iza tion of AlN, ZnO and PZT Thin Film for FBAR De vices", re spec tively. QIAT wel-comes re search ers from all over the world to come to Tai wan to exchange ideas. One of QIAT's goals is to invite the IEEE-UFFC So ci ety to con sider hold ing its Ultrasonics Sym-po sium and/or the Fre quency Con trol Sym po sium in Tai wan in the next few years. For more in for ma tion, please con tact:

Mr. Louis S. Chou
Sec re tary Gen eral, QIAT
No. 4, Kung Yeh 6th Road, Ping Cheng In dus trial Dis trict
Ping Cheng City, Taoyuan Hsien,
Taiwan
Tel. 886-2-2349-2083
Tcst.tp@msa.hinet.net

Mr. Paul Lin
Chair, Board of Di rec tors, QIAT
TXC Corpo ration
Ping Cheng City, Taoyuan Hsien
Taiwan
Tel. 886-3-2894-1201 x3101
paul@txc.com.tw

Prof. Tsung-Tsong Wu
Chair, Ac a demic/Re search Com mit tee, QIAT
In sti tute of Ap plied Me chan ics, Na tional Tai wan Uni ver sity
Tai pei, Tai wan
Tel. 886-2-3366-5663
wutt@spring.iam.ntu.edu.tw

C.S. Lam, Ph.D.
VP and CTO
TXC Corpo ration

Ultrasonics

2002 IEEE INTERNATIONAL ULTRASONICS SYMPOSIUM

In cooperationwith the

The Association for Electrical, Electronic & InformationTechnologies (VDE), Germany

October 8-11, 2002

Forum Hotel, Munich, Germany

Sym po sium in Re view

Over the past two years gen eral chairs, Clem ens Ruppel and Bernhard Tittmann, lead the efforts to plan and or ga nize the 2002 IEEE In ter na tional Ultrasonics Sym po sium. The sym po sium was lo cated in Mu nich, the cap i tal of Ba varia, south ern Ger many. Mu nich it self is one of the larger cit ies in Ger many founded in 1294 with now ~ 1.2 mil lion in hab it ants, but vis i tors re al ize im me di ately that Mu nich does not ap pear like a big city at all, it has pre served its' charm of be ing a nice town.

One of the most fa mous at trac tions in Mu nich is the an nu ally held "Oktoberfest" or so called "Wies'n" which draws more than 6,000,000 vis i tors ev ery year. Since the sym po sium started on Oc to ber 8th, most of these 6,000,000 had left the city and en abled the sym po sium to take place in the Fo rum Hotel which is located close to the "Deutsches Museum" (trans lated - Ger man mu seum) and down town Mu nich. This en abled con fer ence at ten dees to walk down town in the breaks. I think ev ery con fer ence at ten dee had a hard time re strain ing him/her self to at tend the tech ni cal ses sions and not to wan der off into the city and get en chanted by the flair and at mo sphere of cof fee houses, busy shop ping stores, and the green Isar river banks. In de pend ent of the city's lure work, sci ence and en gi neering came first as could be seen in the crowded session rooms that were still crowded on the last con fer ence day.

The sym po sium started out with 9 short courses (or ga nized by Ton van der Steen) as they have been tra di tion in the long his tory of ultrasonics symposia. The topics ranged from fundamental courses to courses with very spe cific and ap plied de vices.

Each course had 20-30 par tic i pants com ing from in dus tries and ac a de mia. This en abled the in struc tors to cre ate a very in tense and per sonal way of giv ing back ground in for ma tion and pro ject ing the fu ture de vel op ments. Even if you al ready know much about the topic it self, have stud ied it in tensely or worked in it for years and years the short course gives you com pressed knowl edge, pro jec tions into the fu ture, and en ables you to chat with other peo ple. Please keep in mind that all in struc tors have ca reers in in dus tries or ac a de mia and have been in this field of engineering and science for a long time. The short course gives you ac cess to this knowl edge, more than just a glance!

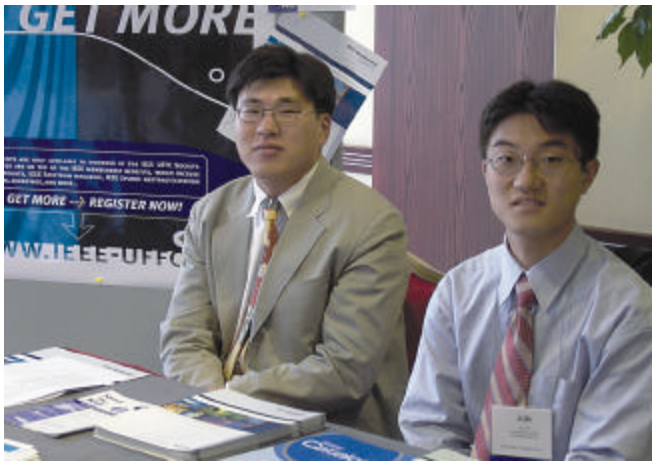
Clem ens Ruppel, Gen eral Co-Chair, and Rob ert Weigel, Tech ni cal Co-Chair cover high lights of the tech ni cal sym po sium in the fol low ing article.

The poster ses sions as well as the in dus trial ex hi bi tions gave plenty of op por tu nity to find po ten tial col lab o ra tors, talk ul tra sound, grieve about lost funding opportunities, do ultrasound busi ness, dis cuss new tech niques and ap proaches for ul tra sound de vices, and meet old and new col leagues and friends.

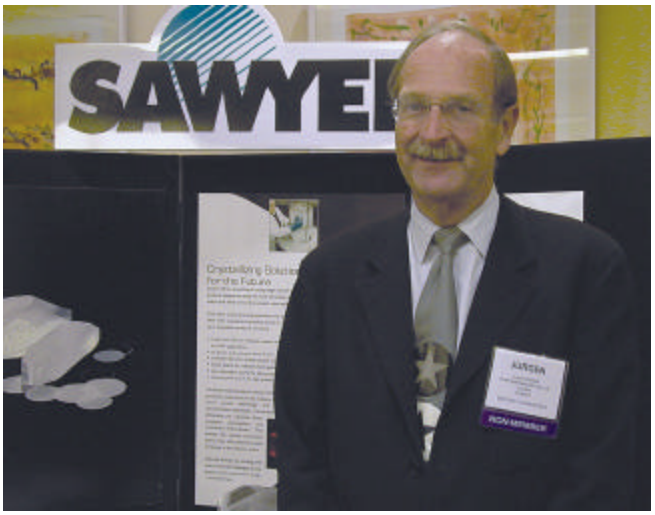
UFFC so ci ety had an ex hi bi tion booth at the en trance to the ex hi bi tion to at tract new mem bers and dis trib ute in for ma tion

Herm van de Vaart, Don Yuhas, and Jim Green leaf at cof fee break

Helmut Ermert and Rob ert Weigel look ing over post ers



UFFC Booth with new Stu dent Poster



Exhibitors

about the new est ben e fits in clud ing full ac cess to the Dig i tal Ar chives (http://www.ieee-uffc.org and please re mem ber that you have to re quest a UFFC pass word be fore en ter ing). Most stu dents who were awarded with IEEE travel sup port vol unteered to staff the booth and hope fully were able to in duce some of the 270 non-mem ber attendees to join the society!

The so cial events that were or ga nized for the sym po sium on Wednes day and Thurs day night were a great suc cess. On Wednesday the Bavarian State Minister of Sci ences, Re search and the Arts, **Hans Zehetmair**, in vited the UFFC com mu nity to a State Re cep tion in the Mu nich Res i dence down town Mu nich with an abun dance of hors d'oeuvres and drinks. Less for mal and very rustic was the ban quet eve ning at the Hofbräukeller with very typ i cal beer benches, dinner and a show program by the authentic Hofbräuhaus Fes ti val Band from Mu nich. Dur ing this eve ning every body got a fla vor of the Ba var ian way of cel e brat ing.

Sorah Rhee
IEEE-UFFC Pub lic ity Chair

Exhibitors

ULTRASONICS IS ON THE MOVE:

THE 2002 IEEE INTERNATIONAL ULTRASONICS SYMPOSIUM WAS HELD IN MUNICH — WHERE THE FLAVOR IS

We look back to a suc cess ful Mu nich event! The ultrasonics re search com mu nity, the in dus try, and the uni ver si ties met in Munich. The 2002 IEEE International Ultrasonics Sym posium, held in Mu nich, Ger many, Oc to ber 8-11, 2002 in co operation with the German VDE Association for Electrical, Elec tronic & In for ma tion Tech nol o gies, brought to gether experts in the ory and tech niques of ultrasonics from all over the world. The sym po sium or ga niz ing com mit tee in cluded **Clemens Ruppel**, Germany and **Bernhard Tittmann**, USA as General Co-Chairs, **Reinhard Lerch**, Ger many and **Robert Weigel**, Austria/Germany as Technical Co-Chairs, and **Astrid Ermert**, Ger many and **Leonhard Reindl**, Ger many as Local Arrangement of fi cers. **Herman van de Vaart**, USA and **Su san Schnei der**, USA were, as al ways in re cent years, re spon si ble re spec tively for the sym po sium fi nances and the pro ceed ings. The ex hib its and short courses were co or di nated by **Jian-yu Lu**, USA and **Ton van der Steen**, The Neth erlands, respectively. Worldwide publicity has been co or di nated by **Helmut Ermert**, Ger many, **Ken-ya Hashimoto**, Ja pan, and **Don ald Malocha**, USA. The sym po sium man agement was car ried out co op er a tively by FASS, USA, and VDE, Ger many. And, young **Johannes Hainzl**, Aus tria, was an excellent webmaster. It was a pleasure to browse through www.ieee-uffc.org/2002! The symposium organizing committee was honored during the President's Reception on Thurs day eve ning.

Ahmad Sa fari and Clem ens Ruppel mys te ri ously the same height.

Ahmad Sa fari (l) pre sent ing Sym po sium Co-Chair, Bernie Tittmann, with a cer tif i cate.

Ahmad Sa fari (l) pre sent ing Tech ni cal Pro gram Co-Chair, Rob ert Weigel, with a cer tif i cate.

Ahmad Sa fari (l) pre sent ing Tech ni cal Program Co-Chair, Reinhard Lerch, with a cer tif i cate.

Ahmad Sa fari (l) pre sent ing Fi nance Chair, Herman van de Vaart, with a cer tif i cate.

Ahmad Sa fari (l) pre sent ing Lo cal Ar range ments Co-Chair, Astrid Ermert, with a cer tif i cate.

Ahmad Sa fari (l) pre sent ing Pub lic ity Co-Chair, Helmut Ermert, with a cer tif i cate.

Ahmad Sa fari (l) pre sent ing Tech ni cal Pro gram Co-Chair, Rob ert Weigel, with a cer tif i cate.

Ahmad Sa fari (l) pre sent ing Pub lic ity Co-Chair, Don Malocha, with a cer tif i cate.

Ahmad Sa fari (l) pre sent ing Ex-hib its Chair, Jian-yu Lu, with a certificate.

Ahmad Sa fari (l) pre sent ing Short Courses Chair, Ton van der Steen, with a cer tif i cate.

Don Yuhas ac cept ing a cer tif i cate on be half of Pro ceed ings Ed i tor Su san Schnei der.

Herm van de Vaart, Bernie Tittmann, Scott Smith, Reinhard Lerch, Clem ens Ruppel.

Din ner out with Marj Yuhas trans lat ing for (clock wise lower left) Mark Romanoski, Gayle Gleichman, Jan Brown, Marj, Loretta Speidel.

Af ter Cannes 1994, Mu nich 2002 was the host for the second Ultrasonics Sym po sium ever held in Eu rope, and we think the decision to follow the proposal of the German/Austrian "ma fia" and bring the sym po sium a sec ond time to Eu rope was in no way a bad one. De spite the cur rent trend of do ing less travel due to some economic and political troubles in many coun tries, we had a re cord-high at ten dance of more than 1000 reg is trants from 37 coun tries with many of them com ing from the U.S. and Ja pan. It is in ter est ing to note that nearly 20% of the reg is trants were stu dents and 7% were guests. To help en abling the stu dents to par tic i pate at the sym po sium, a lim ited num ber of stu dent travel awards were made avail able both on a need and com pet i tive ba sis. We are not com pletely sure what the most im por tant rea son for this high num ber of peo ple at tend ing the symposium was. The dollar-to-Euro ratio? The fact that we have scheduled the symposium right after the well-known Oktoberfest? A re cov ery of the eco nom ics? No, not at all. We as sume that the com bi na tion of an out stand ing tech ni cal program and ex hi bi tion and a great city made Mu nich 2002 such a suc cess ful event!

The Fo rum Ho tel, lo cated in walk ing dis tance to the beau ti ful down town of Mu nich with its nice me di eval char ac ter com bined with el e gant mod ern stores and build ings and many other city sight see ing high lights, and next door to the Deutsches Mu seum and the Gasteig Cul ture Cen ter, and well-con nected to the air port and the Munich public transportation system (S-Bahn station "Rosenheimer Platz" is lo cated right in the same build ing.), was an ex cel lent host of the sym po sium. Of course, due to the high at ten dance, we had to face and deal with some mi nor prob lems because of the some what lim ited space of the ho tel's 2100 square me ters con fer ence cen ter. On the other hand it was ex actly this compactness of the Fo rum con fer ence cen ter, which was very ben e fi cial for fos ter ing di rect, per sonal and fruit ful in ter ac tions and con tacts among the at ten dees. So, all in all, we think that hold ing the event in the Fo rum Ho tel in stead of one of the larger con fer ence cen ters all of which are lo cated in sub ur ban ar eas of Mu nich and not in the cen ter of the city was the right choice. Cultural, shopping, sightseeing and accommodation places were easy to reach for all sym po sium at ten dees and guests.

Short Courses

The sym po sium opened on Tues day with 9 half-day ed u cational short courses set-up in three sub se quent streams (8am to noon; 1pm to 5pm, and 6pm to 10pm). The courses were given by **David Cheeke**, **Douglas White**, **Stanislav Emelianov**, **Victor Humphrey**, **Kai Thomenius**, **Hans Torp**, **Ali Baghai-Wadji**, **Amit Lal & Richard White**, and **Nico de Jong**, re spec tively. The short courses were well at tended; we had in to tal 278 reg is trants.

Ple nary Ses sion

The ple nary open ing ses sion was sched uled on the morning of Wednesday. Here, General Co-Chair **Clemens Ruppel** of fi cially de clared the sym po sium open, Tech nical Co-Chair **Robert Weigel** in tro duced to the tech ni cal pro gram, and UFFC So ci ety Pres i dent **Ahmad Sa fari** and

"Ple nary Ses sion": Ahmad Sa fari, Jan Brown, Cal Quate, Robert Weigel, Reinhard Lerch, Fred Hickernell, Da vid Cheeke.

Ple nary Speaker Dr. Achim Wixforth.

Awards Com mit tee Chair **Reinhard Lerch** pre sented the 2002 so ci ety awards. (See the UFFC Awards) The pre sentation of the Rayleigh Award, the highest honor in the Ultrasonics com mu nity, was made at this time. (See Rayleigh Award fol low ing this ar ti cle)

To close the ple nary ses sion, a fine and highly in ter est ing Plenary Talk en ti tled "The Far Side of Sur face Acous tic Waves" was viv idly pre sented by **Achim Wixforth** of Ger many.

Tech ni cal Program

The tech ni cal pro gram took place from Wednes day to Friday. The pro gram had been set up by our five Tech ni cal Program Com mit tee (TPC) groups ((1) Med i cal Ul tra sound; (2) Sensors, NDE & Industrial Applications; (3) Physical Acous tics, (4) Sur face Acous tic Waves, and (5) Trans duc ers & Trans ducer Ma te ri als) dur ing its sum mer TPC meet ing in Chi cago. Thanks for their great job are due to all 2002 TPC mem bers and in par tic u lar to the five TPC Vice-Chairs rep resent ing each TPC area **Ton van der Steen**, **Da vid Cheeke**, **Bikash Sinha**, **Don ald Malocha**, and **Scott Smith**.

Out of 754 sub mit ted and in vited ab stracts, 539 pa pers were ac cepted for pre sen ta tion. The tech ni cal pro gram in cluded 311 oral and 208 open-fo rum poster pre sen ta tions, which were de com posed into 55 oral and 40 poster ses sions with the oral sessions set-up in five par al lel ses sion streams. In gen eral, we had very good pre sen ta tions and nearly no no-shows; and we had 23 in vited pa pers pre sented by high-cal i ber au thors.

Fo cused Ses sions

New this year were Fo cused Ses sions. Each fo cused session highlighting a theme of spe cial gen eral, in ter dis ciplinary interest. Reflecting the impact of the focused session on the quality of our technical program we can con clude that the fo cused ses sions greatly con trib uted to the at trac tive ness of our sym po sium! Each TPC group or ga nized one fo cused ses sion:

- Group 1 – High Fre quency Im ag ing of Liv ing Cells
- Group 2 – Ad vanced Ul tra sonic Meth ods for Eval u a tion of Con crete Struc tures
- Group 3 – Geo phys i cal Pros pect ing Us ing Sonics and Ultrasonics
- Group 4 – SAW Mod ules and Du plex ers
- Group 5 – Ul tra sound MEMS

Student Paper Compe ti tion

The unique for mat of the tech ni cal pro gram in te grated also a spe cial stu dent pa per com pe ti tion. Out of the sub mit ted stu dent pa pers, the TPC had se lected 20 pa pers for the fi nal stu dent paper con test. The fi nal ist's stu dent pa pers were pre sented in a special poster ses sion and eval u ated by a re view com mit tee. The five win ners (one from each area of the TPC) were:

Group 1 – Med i cal Ultrasonics

C.M. Gallippi
Duke University Department of Biomedical Engineering, USA
"Adap tive Clut ter Fil ter ing via Blind Source Sep a ra tion for Lat eral Blood Ve loc ity Mea sure ment"

Caterina Gallippi, Group 1 Stu dent Pa per Award Re cip i ent with Ahmad Sa fari.

Claudio Cosenza, Group 2 Stu dent Pa per Award re cip i ent with Ahmad Sa fari.

Alexander Müller, Stu dent Pa per Award Group 4 be ing con grat u lated by Ahmad Sa fari.

Group 2 – Sen sors, NDE, and In dus trial Applications

C. Cosenza
Uni ver sity of Palermo, Palermo, It aly
"Non-contact Ultrasonic Inspection of Skin/Core Bond in Hon ey comb with Lamb Waves"

Group 3 – Phys i cal Acous tics

C. Lee
Uni ver sity of Wis con sin-Mad i son, USA
"Low-Volt age High-Speed Ul tra sonic Chro ma tog ra phy"

Group 4 – Sur face Acous tic Waves

A. C. Müller
Sektion der Physik der Ludwig-Maximilians-Universität München, Ger many
"Spa tially Re solved Sur face Acous tic Wave Stud ies for Im age Pro cess ing"

Group 5 – Trans duc ers and Trans ducer Materials

M. M. Voormolen
Eras mus Uni ver sity Rot ter dam, The Neth er lands
"A New Ar ray Trans ducer for 3D Har monic Im ag ing"

Chung Hoon Lee, Stu dent Pa per Award Group 3 be ing con - grat u lated by Ahmad Sa fari.

Marco Voormolen, Stu dent Pa per Award Group 5 be ing con- grat u lated by Ahmad Sa fari.

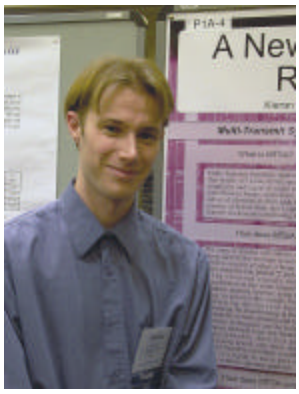
The five win ners re ceived a cer tif i cate and a cash award and, as was the case with all fi nalists, spe cial ac com mo da tion at the next-door Kerschensteinerkolleg of the Deutsches Museum. Let us thank here Lo cal Ar range ments of fi cer **Leonhard Reindl** who made pos si ble to ar range the spe cial ac com mo da tion pack ages at the Kerschensteinerkolleg!

The Pres i dent of the UFFC So ci ety, Prof. Ahmad Sa fari pre sented the awards, dur ing the of fi cial re cep tion of the Bayerische Staatsregierung, which was held on Wednes day, 9 th Oc tober, for the at ten dees of the IEEE Ultrasonics Sym po sium at the Res i dence in Mu nich. There, also the of fi cial rep re sen ta tive of the State of Ba varia for this eve ning and Secretetary of State for Sci ence, Dr. Hans Zehetmair, was the first to of fer his con grat u la tions to the win ners.

1

STUDENT PAPER FINALISTS

Your News let ter Ed i tor mis placed the list with the names of the stu dent pa per fi nal ists for the pho tos be low. Please no tify me jan.brown@ieee.org to iden tify the pho tos and we'll give proper credit in the next news let ter.



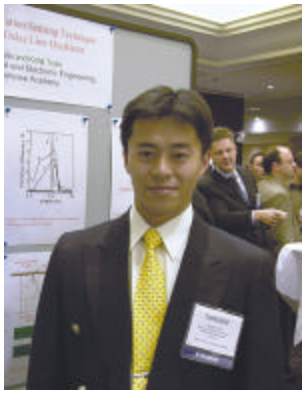
2

3

4

5

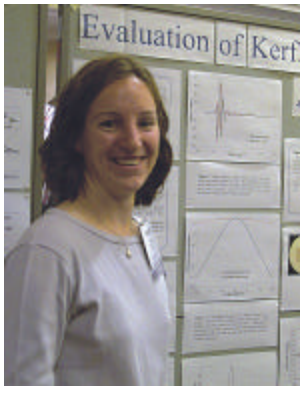
6



7

8

9



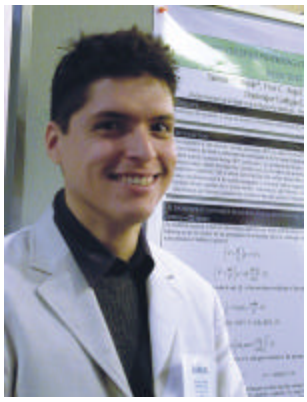
10

11

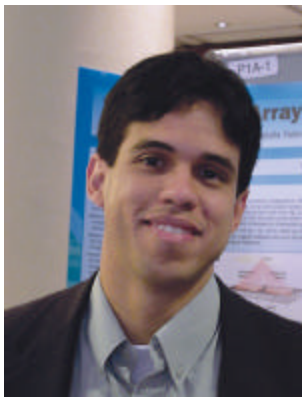
12

13

14



15



16

17

18

19

Social Events

Of course, the symposium incorporated many technical and social side meetings as well as official social meetings such as the Social Gathering in the Munich Residence and the Banquet at the Hofbräukeller. On Wednesday evening, the Bavarian State Minister of Sciences, Research and Arts, **Hans Zehetmair**, invited us to a State Reception into the Munich Residence, a magnificient complex of buildings constructed by the powerful Wittelsbach family who had ruled Bavaria for about 800 years.

Dr. Hans Zehetmair during Residence Reception

State Reception in the Baroque Golden Hall of the Munich Residence

Ahmad Sa fari at Mu nich ResidenceReception.

Clem ens Ruppel at Mu nich ResidenceReception.

Ba roque Golden Hall of MunichResidence.

Rob ert Weigel, Georg Schmidt, Clem ens Ruppel, Hans Zehetmair, Ahmad Sa fari

Ba roque Golden Hall of MunichResidence.

On Thurs day eve ning, the sym po sium's banquett was held at the Hofbräukeller with a Ba var ian d inner served. Typ i cal Ba var ian en ter tain ment was pro vided by the fa mous Hofbräuhaus fes ti val band.

Rob ert Weigel deep in thought?

Now we know Clem ens Ruppel's se cret for great heights.

Ba var ian "Cow boy" – John Vig

For spouses and attendees, **Astrid Ermert** and **Leonhard Reindl** had made ex cel lent ar range ments. On Wednes day, a warm-up walk ing tour was of fered to Munich's old town and the Nymphenburg cas tle mak ing stops at the Marienplatz, the Viktualienmarkt, the Frauenkirche and the Bambergerhaus. On Thurs day, a bus tour to the Chiemsee lake ("Ba var ian Sea") was sched uled mak ing stop at the island of Herrenchiemsee to visit King Ludwig's cas tle of Herrenchiemsee. On Fri day, a bus tour to Füssen took place mak ing stops at King Lud wig's fa mous fairytale cas tle of Neuschwanstein and at Ger many's most beau ti ful Ro coco church Wieskirche.

Post Symposium Conference

Fi nally, on Oc to ber 14, 2002 in Salzburg, Aus tria (Dorint Ho tel) an Ultrasonics Symposium Post Conference Full-Day Workshop on W-CDMA RF Is sues and Fu ture Trends was or ga nized by **Ken-ya Hashimoto**, **Mario Huemer**, Aus tria and **Robert Weigel**. This work shop was also well-at tended, mainly by our Jap a nese friends who were much in ter ested in the SAW-re lated Eu ro pean de vel op ments on wideband CDMA.

We would like to thank all of you who con trib uted to a great Mu nich 2002 sym po sium! And we look foreward to meet ing you in Ho no lulu for the 2003 IEEE In ter na tional Ultrasonics Sym po sium.

Clem ens Ruppel and Rob ert Weigel

Rayleigh Award

The Ray leigh Award is pre sented by the IEEE UFFC Ultrasonics Com mittee rec og niz ing mer i to ri ous service to the UFFC So ciety in the field of Ultrasonics. The achieve ment may be in tech ni cal in no va tions, re search, edu ca tion, pub li ca tions and re lated pro fessional en deav ors. Typ i cally, the re cip i ent will have dem on strated these accomplishments over a sustained period of time. An Awards Com mit tee con sist ing of the Ray leigh Award Chair, the Technical Program Chair and the Technical Program Vice-Chairs will make se lec tion in the spring of each year.

The award con sists of an hon o rar ium of $1,000, a plaque and a cer tif i cate.

2002 Ray leigh Award Re cip i ent

Ray leigh Award Recipient, Prof. Cal Quate.

The UFFC So ci ety of fers its con grat u lations to the re cip i ent of the 2002 Rayleigh Award**, Prof. Calvin F. Quate**, Professor of Electrical Engineering at the Stan ford Uni ver sity, USA.

The 2002 Ray leigh Award was presented dur ing the open ing cer e mony of the Ultrasonics Sym po sium in Mu nich. The pre senter for Prof. Quate's was Dr. Khuri-Yakub from Stan ford Uni ver sity. Pro fes sor Khuri-Yakub ap pre ci ated the scientific life's work of Cal Quate by rec og niz ing all his ma jor con tri bu tions and pi o neer ing work in the field of ul trasound, such as Ultrasonic Imaging and Atomic Force Microspcopy as well as related areas, such Lithography and Micromaching.

The ci ta tion of his plaque reads: "***for pi o neer ing con tri butions to the development of the scanning acoustic mi cro scope and the atomic force mi cro scope"***

Ray leigh Award Nom i na tions

Nom i na tions may be sub mit ted at any time. A mem ber may submit a nom i na tion by send ing the nom i nees name, af fil i a tion and that person's main contributions, along with the submitter's own name and af fil i a tion to:

Prof. J. Da vid N. Cheeke
Chair, Ray leigh Award Committee
Physics Department
Con cordia Uni ver sity
1455 de Maisonneuve Blvd West
Mon treal ,Qc
Can ada H3G 1M8
FAX: 514-848-2828
E-Mail: cheeke@alcor.con cordia.ca

Da vid Cheeke in tro duc ing the Ray leigh Award.

Past Re cip i ents of the Ray leigh Award

The first pre sen ta tion of the Ray leigh Award was in 2001.

Ger ald W. Farnell, 2001: for his de voted ser vice and contri bu tions to the IEEE UFFC So ci ety in the field of Ultrasonics and for his orig i nal work in the ar eas of sur face wave prop a gation in anisotropic ma te ri als.

Ray leigh Award Pre sen ta tion (l-r) Pi erre Khuri-Yakub, Da vid Cheeke, Cal Quate, Ahmad Sa fari.

2003 IEEE International Ultrasonics Symposium

Special Notes

- Venue:
  Hilton Hawaiian Village, Honolulu, Hawaii
  October 5 - 8, 2003
- Abstract submission deadline: May 22, 2003
- Complete symposium information can be found at:
  http://www.ieee-uffc.org/2003/

Invitation from the Co-Chairs

General Co-Chairs (from l. to r.): James F. Greenleaf (jfg@mayo.edu) and William D. O'Brien, Jr. (wdo@uiuc.edu).

Aloha! We invite you to join us at the 2003 IEEE International Ultrasonics Symposium that will be held October 5-8, 2003, at the Hilton Hawaiian Village in Honolulu, Hawaii. Located on Waikiki's widest stretch of beach, the Hilton Hawaiian Village Beach Resort & Spa features lush tropical gardens, waterfalls, exotic wildlife and priceless art work. Honolulu means "protected harbor," is the capital of Hawaii and is Oahu's largest city. The Technical Program Committee has been enhanced and we expect a stimulating technical program. As before, there will be a mix of invited and contributed papers. The Social Committee has prepared an attractive program for participants and guests. We are looking forward to an excellent program, and to meeting you in Honolulu.

Visit http://www.ieee-uffc.org/2003/ to see the latest information about the Symposium.

Plenary Session

Shrimp, Snap, Bubble, and Pop

Michel Versluis,
University of Twente,
Enschede, The Netherlands

The oceans may be deep, but they are not at all quiet. Sounds in the ocean include those of waves, produced by tides, winds and thunderstorms, and those of falling rain, hail and snow. In addition, one can hear biological sounds of fish, dolphins, whales and snapping shrimp. The latter, in particular, produce the dominant level of ambient noise in (sub)tropical shallow waters throughout the world. These shrimp live in colonies in such large numbers that there is continuous snapping, providing a permanent crackling background noise.

The snapping sound can be heard day and night, with source levels as high as 200 dB which severely limits the use of underwater acoustics for active and passive sonar, both in scientific and naval applications. The frequency spectrum of a snap is extremely broad, ranging from tens of hertz to beyond 200 kHz. The snapping shrimp produces the impulsive click by an extremely rapid closure of its so-called snapper claw. It was commonly believed that the sound is generated when the two claw halves hit each other.

In this talk we will in fact see that the sound of snapping shrimp originates solely from the collapse of a cavitation bubble that is generated by the fast waterjet resulting from the rapid claw closure. The waterjet velocity is so high that the corresponding pressure drops below the vapor pressure of water and a cavitation bubble is generated which will initially grow in size, then it collapses violently when the pressure rises again.

In the course of our experiments on snapping shrimp sound we also discovered a short intense flash of light emitted at bubble collapse. The light emission reveals the extreme pressures and temperatures of at least 5000 K in the bubble interior at bubble collapse. In light of the apparent similarity with sonoluminescence, the light emission of a bubble periodically driven by ultrasound, we have termed this phenomenon shrimpoluminescence.

Student Paper Competition

This is the third year of the student paper competition. The awards consist of a certificate, and are a prestigious addition to the students CV. Students who are submitting abstracts for presentation are also invited to participate in this student paper competition.

Abstracts submitted by students for the Student Paper Competition will be reviewed as usual by the Technical Program Committee (TPC). At that time the TPC will select 15 finalists in the Student Paper Competition. The finalists will be notified and asked to produce a poster of their papers to be displayed during a special student poster session. The poster is required independent of whether the student's paper has been selected as an oral presentation. On the first day of the symposium, October 6, all Student Finalist Posters will be presented in a special room for judging by a panel of judges representing the paper's technical group. The posters will remain on display for the duration of the three-day symposium.

Prizes will be given for papers in each of five areas of the TPC:

1. Medical Ultrasonics.
2. Sensors, NDE & Industrial Applications.
3. Physical Acoustics.
4. Surface Acoustic Waves.
5. Transducers & Transducer Materials.

Selection criteria are:

1. Student is first author.
2. Work is of high quality and done by the student.
3. Abstract clearly describes the work and includes results.
4. Student has not won the student prize previously.

At the time of judging the judges will evaluate:

1. Clarity of student's presentation.
2. Depth of student's knowledge.
3. Degree of the student's contribution to the project.
4. Relevancy of the work to the field.

Mahalo,
***James F. Greenleaf* (jfg@mayo.edu)**
***William D. O'Brien, Jr.* (wdo@uiuc.edu)**
General Co-Chairs

Minutes of the IEEE/UFFC-Ferroelectrics Committee Meeting

Monday December 2, 2002
Boston, MA

The IEEE/UFFC Ferroelectrics Committee Meeting was held in conjunction with the 2002 Materials Research Society Fall Meeting in Boston. The meeting was called to order by the Ferroelectrics Committee Chair Dr. Susan Trolier-McKinstry at 8:00 pm. Attending were: Dr. Susan Trolier-McKinstry, Dr. Ahmad Safari, Dr. Tadashi Takenaka, Dr. Relva Buchanan, Dr. Angus Kingon, Dr. Tom Cutchen, Dr. Jon Paul Maria, Dr. Qiming Zhang, Dr. Stephen Streiffer and Dr. Ahmed Amin. The minutes of the meeting were recorded by Ahmed Amin for the first part of the meeting and Qiming Zhang for the latter part of the meeting.

ISAF 2002

Dr. Takenaka, co-organizer of the ISAF 2002 meeting, presented a summary of this highly memorable meeting that was held in Nara, Japan from May 28th to June 1st 2002. It was part of the first-ever joint meeting of three different organizations: ISAF (International Symposium on the Applications of Ferroelectrics, sponsored by the IEEE Ferroelectrics Committee), ISIF (International Symposium on Integrated Ferroelectrics) and FMA (Ferroelectric Materials and Applications, Japan domestic meeting on applications of ferroelectrics). A detailed report of the number of participants (737), the presented and published papers, and a financial summary were presented. The meeting is expected to generate income of approximately $6500.00 for the ISAF, including sales of Proceedings. All aspects of this joint meeting (academic, social, and cultural) were a great success. Dr. Takenaka received a standing ovation from the committee members for the efforts he and Dr. David Payne provided in organizing and carrying out ISAF 2002.

ISAF 2004

The next item that was scheduled was a brief summary from Drs. S. Pilgrim and Walter Schultz regarding the ISAF 2004 Meeting to be held during August 24-27, 2004 in Montreal, Canada. Unfortunately, Dr. Pilgrim and Dr. Schulze were not available for comment. Concern was raised by some members about the timeline adherence of Drs. Pilgrim and Schulze to the preparatory aspects of the 2004 meeting. Dr. Buchanan volunteered to pursue this point with Dr. Schulze. A report is essential at the Spring 2003 meeting of the Ferroelectrics Committee

ISAF 2006

Dr. Jon Paul Maria, organizer of the ISAF 2006 meeting, provided a brief report to the Committee on the present status of planning for this meeting.

The 2006 meeting is being co-sponsored by North Carolina State University, and will take place in the Raleigh, NC Convention Center, with Jon Paul Maria as General Chair. Dr. Maria indicated that several of the supporting chair positions are filled, with the Proceedings Chair still open. The Convention Center is an excellent facility, and will be quite suitable for the meeting. The location is beneficial in that it will be within automobile driving distance for many students in the ferroelectric field.

The possibility of having a joint meeting with ISIF was discussed, and several "lessons-learned" comments were offered regarding such an option, based on the ISAF 2002 meeting at Nara. Dr. Trolier-McKinstry indicated a willingness to discuss the possibilities with the ISIF leadership, and to reflect the views of the Committee that we will not guarantee $25,000, etc., over and above ISAF. Dr. Stephen Streiffer arrived about this time and stated that ISIF's leadership was negative about a joint meeting, primarily because of controversy regarding finances.

AdCom Status and FE Committee Review

Dr. Ahmad Safari presented a financial summary of IEEE and the UFFC Society. The IEEE as a whole is suffering financially from the stock market decline. As a result, aggressive organizational reforms are being considered by the new IEEE president. Ahmad also commented that the Ferroelectric Committee

mem bers should be more ac tive in UFFC ac tiv i ties. For ex am-ple, the ISAF conference chairs for the next ISAF meeting should at tend the AdCom meet ings. Joint meet ings with other sec tions of UFFC by Ferro elec trics Com mit tee mem bers will enhance the ties of the ferroelectrics community to the ultrasonics and fre quency con trol com mu ni ties

Ferro elec tric Com mit tee Mem ber ship Cri te ria

The is sue of who should be in cluded in the Ferro elec tric Com mit-tee was dis cussed and it was sug gested that the ten ure of a Com-mit tee mem ber should not be much lon ger than 10 years to give other in di vid u als a chance to par tic i pate in the Ferro elec tric Com-mit tee ac tiv i ties. Some of the in ac tive mem bers may not need to be in the Com mit tee in the fu ture. The ques tion of how to de fine an ac tive Com mit tee mem ber was raised. In gen eral, three lev els of par tic i pa tion were sug gested: a) com ing to the Com mit tee meet ing at least once a year; b) par tic i pat ing in the So ci ety ac tiv i ties; and c) not ac tive at all. Ahmad Sa fari and An gus sug gested that Su san should take a look of the cur rent Com mit tee makeup and rec om-mend who should be serv ing. The fu ture Com mit tee com po si tion should in clude stu dent mem bers and more in ter na tional mem bers (40% in ter na tional mem bers in ad di tion to the US mem bers. Su-san also asks ev ery one in the cur rent Ferro elec tric Com mit tee to rec om mend new in ter na tional mem bers from Eu rope, Ko rea, etc.

IEEE/UFFC Ferro elec trics Web Page

Although she could not attend the meeting in per son, Sorah Rhee, the FE Com mit tee Web Mas ter sup plied a de tailed writ-ten report on her activities and concerns for the IEEE UFFC-Ferro elec trics web site. Sorah has done a great deal to en hance the qual ity of the Ferro elec trics Website. A few sug-gestions were made by Committee members to improve the Website. Sorah is al ready try ing to im ple ment many of these sug ges tions. It was sug gested by those pres ent that there should be more re view ar ti cles on ferro elec trics and re lated top ics. It was also sug gested that Com mit tee mem bers should pro vide appropriate il lus tra tions and pic tures re lated to var i ous ferro-elec tric prop er ties, phe nom ena, and de vices that can be added to the web site. Ahmad Sa fari sug gested that the Cal en dar of Events listed on the web could be up-dated more of ten.

IEEE Fel lows

How the Ferro elec trics Com mit tee plays a role in pro mot ing more Senior Members and Fellows in IEEE was also dis-cussed. Dr. Cross is one of the few IEEE Fel lows from the ferro elec trics com mu nity.

Dis tinguished Lec turer

Dr. Nava Set ter will be the next Dis tin guished Lec turer.

Elec tion for Vice Chair

The com mit tee dis cussed the two ex cep tional can di dates for Vice Chair of the Ferroelectrics Committee: Marija Kosec and Ste phen Pil grim. Ste phen Pil grim was elected to be the next Vice Chair of the Ferro elec trics Com mit tee by com bined email bal lot ing and votes cast in per son at the meet ing. In ad di tion, the term of the Com mit tee Chair was dis cussed. Cur rently, the Chair serves for two years. There was gen eral agree ment that it would be better to have the Com mit tee Chair serve for four years rather than two. The ad van tages for a four-year term in clude that the Com mit-tee ac tiv i ties can be better co or di nated since it takes quite some time for the Chair to be come fa mil iar with the sys-tem, and to better rep re sent the Ferro elec trics Com mit tee to IEEE.

Ferro elec trics Stan dard

Su san plans to have an other IEEE Ferro elec trics Stan dard Com mit tee meet ing. Af ter that, the draft for the Ferro elec-tric Stan dard will be re leased to gen eral mem bers for any in put be fore the fi nal ver sion. Cur rently, the Ferro elec trics Stan dard Com mit tee Chair is Al Meitzler. Be cause of his pres ent eye prob lems, he has rec om mended that he be re-placed by Su san Trolier-McKinstry as the Stan dards Com-mit tee Chair, and that he serve as the Vice Chair for the Stan dards Com mit tee.

Don Smyth Ac knowl edge ment

Professor Don Smyth has resigned from the Ferroelectrics Committee after an illustrious career as an educator, re-searcher and managerial head of sev eral large re search pro-grams. Don cited the fact that he is not trav el ing to as many tech ni cal meet ings as in the past now that he is re tired. Thus, his at ten dance at Ferro elec trics Com mit tee meet ings would be spo radic. The com mit tee thanked Don for his many years of ser vice to the Ferro elec trics Com mit tee and his many con tri-bu tions to the ferro elec trics com mu nity.

Date for the Next Ferro elec trics Com mit tee Meeting

The date for the next Ferro elec tric Com mit tee meet ing was dis cussed. It was rec om mended that it take place at the Amer i-can Ce ramic So ci ety Meet ing in Nash ville in late April 2003, but a pos si ble meet ing in con nec tion with the US/Ja pan Sem i-nar on Di elec trics and Piezoelectrics in Ja pan was also dis-cussed. Su san will send an e-mail to all Com mit tee mem bers to so licit their in put for the date.

Ahmed Amin, Qiming Zhang and Bruce Tuttle
De cem ber 20, 2002

Ferroelectrics Recognition Award

The Ferroelectrics Recognition Award is given out by the Ferro elec trics Stand ing Com mit tee in a two-year term in or der to honor mem bers of the Ferro elec trics So ci ety for out stand ing achieve ments in their sci en tific work as well as in pro mot ing the Ferro elec trics Com mu nity.

Please con tact Steve Pil grim pil grim@al fred.edu for fur ther in for ma tion and sug ges tions for can di dates.

2002 Re cip i ents of the Ferro elec trics Recog ni tion Award

Congratulations to the 2002 recipients of the Ferroelectrics Rec og ni tion Award on be half of the IEEE UFFC:

Yao Xi — Tonji University and Xian Jiaotong Uni ver sity (China)
For technical innovation in the ferroelectric field, educational leadership in elec tronic ce ram ics in China, and out stand ing ser vice to the ferro elec tric com mu nity both do mes ti cally and internationally.

Yukio Sakabe — Murata Manufacturing Co. Ltd. (Ja pan)
For out stand ing re search and de vel op ment of ce ramic di elec trics for use with base met als and for tech no log i cal in no va tion in multilayer ce ramic ca pac i tors.

Past Recipients of the Ferroelectrics Recognition Award

2000 Ahmad Sa fari — Rutgers Uni ver sity (USA)

For technical accomplishments in the field of ferroelectric ma te ri als and pi ezo elec tric com pos ites and for his lead er ship within the so ci ety which has re sulted in an in creas ingly in ter na tional and in te grated ferro elec tric com mu nity.

2000 Rainer Waser — RWTH Aachen and FZ Jülich (Ger many)

For his work on de fect chem is try in perovskites lead ing to im proved per for mance and de vices and for his lead er ship within the in ter na tional ferro elec tric com mu nity.

1992 Wallace Smith – Of fice of Na val Re search (USA)

For ma jor con tri bu tions to the un der stand ing of pi ezo elec tric ceramic/polymer composites and effective con tin u ing ad vo cacy of ferro elec tric pro grams.

1988 Jan Fousek – Tech ni cal Uni ver sity of Liberec (Czech Re pub lic)

For outstanding contributions to the understanding of Do main Phe nom ena in Ferro elec tric Crys tals.

1988 Kiyoshi Okazaki – Shonan Institute of Technology (Japan)

1986 Cecil Land – Sandia Na tional Lab o ra to ries (USA)

For creative and innovative research on ferroelectric and eletro-op tic phe nom ena in ce ramic ma te ri als and de vices.

1983 Eric Cross – The Penn syl va nia State Uni ver sity (USA)

For his out stand ing con tri bu tions to the sci en tific un der stand ing and tech no log i cal ap pli ca tion of ferro elec tric ma te ri als.

1983 Issai "Lef" Lewkovitz – AROD Uni ver sity of North Carolina (USA)

Chapter Activities

Japan Chapter

The Ja pan Chap ter held 6 tech ni cal meet ings dur ing the sec ond half of 2002, in con junc tion with the Tech ni cal Group on Ultrasonics of the Institute of Electronics, Information and Com mu ni ca tion En gi neers of Ja pan and the Acous ti cal So ci ety of Ja pan:

Date	Papers	Venue
1) July 5	10	Tokyo
2) Au gust 27	9	Chiba
3) Sep tem ber 19-20	17	Sendai
4) Oc to ber 25	5	Tokyo
5) No vem ber 29	10	Shizuoka
6) De cem ber 16	6	Yokohama

UFFC-S 2002-2003 Dis tin guished Lec turer Program

Pro fes sor K. Kirk Shung of Uni ver sity of South ern Cal i for nia, the UFFC-S 2002-2003 Dis tin guished Lec turer, was in vited and stayed in Ja pan from Nov. 6 to Nov. 14. He fa vored us with im pres sive and in struc tive lec tures on "Ul tra sound: an un ex plored tool for blood flow visualization and hemodynamic mea sure-

Prof. Shung giv ing an in vited talk at the 23rd Sym po sium on Ul tra sonic Elec tron ics held in Kanazawa.

Prof. and Mrs Shung en joy ing the ban quet of USE2002 at Kanzawa In sti tute of Tech nol ogy.

ments" at the USE 2002 Sym po sium in Kanazawa. He also gave us lec tures on "Cur rent and fu ture in no va tions in high fre quency ultrasonic trans duc ers and ar rays" at the meet ing of the 150th Committee on Acoustic Wave Device Technology held at Tohoku Uni ver sity in Sendai. Lec ture meet ings were also held at Aloka Co., Ltd. in To kyo and at Toshiba Cor po ra tion Med i cal Sys tems Com pany in Nasu.

23rd Sym po sium on Ul tra sonic Elec tron ics (USE2002)

The 23rd Symposium on Ultrasonic Elec tron ics (USE2002) was held in Kanazawa on Nov. 7-9, cosponsored by the UFFC-S Ja pan Chap ter, and at tended by 357 par tic i pants. There were three in vited talks (one of them by Prof. Shung), and 185 con trib uted pa pers were pre sented. Most of the pa-pers pre sented at the Sym po sium will be pub lished in a spe cial is sue of the Jap a nese Jour nal of Ap plied Phys ics, Vol. 42, No. 5B (2003). Ti tles and ab stracts of the ar ti cles in JJAP, in clud-ing back is sues, may be browsed by ac cess ing the JJAP home page at http://jjap.ipap.jp/.

2003 Of fi cers

The new of fi cers of the Ja pan Chap ter for 2003 are:

Chair: Pro fes sor Jun-ichi Kushibiki, De part ment of Elec tri-cal En gi neer ing, Grad u ate School of En gi neer ing, Tohoku Uni-ver sity, Aramaki Aza Aoba 05, Aoba-ku, Sendai 980-8579

Vice Chair: Pro fes sor Masatoshi Adachi, De part ment of Elec-tron ics and In for ma tics, Fac ulty of En gi neer ing, Toyama Pre fec-tural Uni ver sity, Kosugimachi, Toyama 939-0398

Secretary and Treasurer: Associate Professor Minoru Kuribayashi Kurosawa, Department of Advanced Applied Elec tron ics, To kyo In sti tute of Tech nol ogy, 4259 Nagatsuta, Midori-ku, Yo ko hama 226-8502

Yasuhiko Nakagawa
Chair (2001-2002)
UFFC-S Ja pan Chap ter

At the wel come party held in Sendai. Front row (left to right): Kazuhiko Yamanouchi, Kirk Shung, Linda Shung, Noriyoshi Chubachi. Back row (left to right): Jun-ichi Kushibiki, Kiyoshi Nakamura, Hiroshi Kanai, Ken Yamada (Vice Chair).

A lecure on high fre quency trans duc ers at Tohoku Uni ver sity.

UFFC AdCom

AdCom Class of 2005

Wel come to the newly elected AdCom mem bers!

From **Ultrasonics** we wel come **DR. Kullervo H. Hynynen**. Originally from Finland, Dr. Hynynen is now As so ci ate Pro fes sor of Ra di-ol ogy and the Di rec tor of the Fo cused Ul tra-sound Laboratory at the Brigham and Women's Hos pi tal in Mas sa chu setts.

Dr. Thomas R. Shrout joins us from the **Ferro-elec trics** community where he is cur rently the Co-Di rec tor of the Cen ter for High Per for mance Piezoelectric and Co-Investigator of the NIH Re source on Med i cal Ul tra sonic Trans duc ers at Penn syl va nia State Uni ver sity.

Representing the **Frequency Con trol** com-munity is **Dr. R. Michael Garvey** who is Chief Technical Officer of the Technology Re source Cen ter at Symmetricom in Mas sa-chu setts. Through out his ca reer, he has been involved in the design of atomic frequency standards. Mike has taken on the awesome task of be ing the Gen eral Chair for the UFFC Joint Sym po sium in 2004.

Dr. Mathias A. Fink was elected as the **Regions 8–10 Rep re sen ta tive** to AdCom. Since 1979 he has served as Sci en tific Ad vi sor of Phillips Re-search France in the field of ul tra sonic im ag ing.

UFFC-Society AdCom Meeting Minutes of 7 October 2002

[Subject to AdCom Approval]

Society President Ahmad Safari called the Administrative Com mit tee (AdCom) meet ing of the Ultrasonics, Ferro elec-trics, and Frequency Control Society (UFFC-S) to or der at 8:40 am, 7 Oc to ber 2002. The meet ing was held in con junc-tion with 2002 IUS Sym po sium held in Mu nich, Ger many.

Fred Hickernell made and Lute Maleki sec onded a mo tion that passed To approve the 7 June 2002 (Chicago, Illinois) AdCom min utes as cor rected.

Attendees

Art Ballato
Ger ald Bless ing
Ray mond Brennan
Jan Brown
Mauricio P. daCunha
Mike Driscoll
Stu Fos ter
James Green leaf
Gordon Hay ward
Fred Hickernell
Jac que line Hines
John Hossack
Eunki Hong
John Kosinski
Reinhard Lerch
Jian-yu Lu
Lute Maleki
Kiyoshi Nakamura
Rajesh Panda
Sorah Rhee
Clem ens Ruppel
Ahmad Sa fari
Bernie Tittmann
Su san Trolier-McKinstry
Herman van de Vaart
John Vig
Mar jo rie P. Yuhas

(Note: 20 vot ing mem bers were pres ent for most of the meet-ing's busi ness; Reinhard Lerch was at the con fer ence for most of the meet ing, as was Sorah Rhee)

President's Report

Ahmad Sa fari said that he had ap pointed a com mit tee to re-view the ac tiv ity of each of the three tech ni cal ar eas. Gerry Bless ing will re port on the Ferro elec trics Com mit tee re view as he was chair of com mit tee. Both Fre quency Con trol and Ultrasonics will be re viewed dur ing the next year (FC – May, U – Oc to ber). Ahmad also asked for the chairs of the stand ing com mit tees to nom i nate vice-chairs, and dis cussed his lead ing a delegation to china in a few weeks funded by the peo-ple-to-peo ple am bas sa dor's pro gram.

Sec re tary's Re port

Jackie Hines re quested that at ten dees up date the AdCom list-ing, agreed to send out an e-mail mes sage to the en tire AdCom with this list, and took counts for din ner.

Finance Report

Chair Herman van de Vaart pro vided writ ten and oral re ports of the So ci ety's fi nances. The op er at ing fi nan cial state ment showed that the bud geted re sults for the year should be al most a break even sit u a tion, with only a slight def i cit of $15.5k. How ever, re sults will be worse than that for a num ber of rea sons. In come from the All Trans ac tions Pack age will be about $62k short of the orig i nal bud get IEEE provided – why – who knows. Also, vol un tary page charges are down from what they nor mally are. This could be due to FASS re-doing their technology system and being slow on transferring funds to our account, so the amounts may go up. Trans ac tions costs billed by FASS so far add up to about $186k which seems to be on sched ule – at this rate they should end up at about $286k which is in line with bud get. Sym po sium in come will be way be low bud get due to the 2001 Ultrasonics Sym po sium that re sulted in a loss of $41k in stead of the bud geted sur plus of $92.9k and the 2001 Fre quency Con trol Sym po sium which re sulted in a loss of $26.3k in stead of the bud geted sur plus of $35.6k. Off set ting this some what, there are no sym po sium re lated speaker ex penses. Herman ex pects a $220k def i cit for the full year, in stead of the bud geted re sult which shows us nearly break ing. With the def i cit of $220k, our net worth will be about $155k at the end of the year. We have $120k of out stand ing loans, so by the end of the year, pooled as sets will be down to $35k. Look ing at 2003, the only changes in the bud get are the sur plus from the 2002 Ferro elec trics Sym po sium, which has been changed to more rea son able num bers from 29k to 6.7k, and IEEE TAB admin ex penses were changed from 242k to 172k. So over all we have a sur plus of 93k bud geted for 2003.

Lute Maleki stated that the 2002 Fre quency Con trol Sym po sium should net more than the $22.9k ex pected. Sev eral ques tions were asked re gard ing de tails of the fi nan cial state ments and out look for the So ci ety's fi nan cial fu ture, and were an swered by Herman. These in cluded de tails re gard ing when in come and ex penses from symposia are recognized on the financial state ments, whether bud geted sur pluses for fu ture con fer ences are rea son able, and how bud geted amounts were changed to take into ac count changes in trans ac tions pub li ca tion pol icy this year. Herman in di cated that the bud geted Trans ac tions net in come is 51.3k and we will be close to that. We don't ex pect sur prises in the Trans ac tions. The big un ex pected ex penses this year were losses on sym po sia and the in fra struc ture charges.

Unfinished Business

How to han dle pro vid ing CDs of so ci ety pub li ca tions to mem bers will be dis cussed un der pub li ca tions. No fur ther un fin ished busi ness.

Publications

Jan Brown, Publications VP, presented an oral report. She stated that sev eral new things are com ing. Of the $226M in budgeted IEEE revenue, $119M comes from publications, and of that 65% co mes from pub li ca tions di rectly gen er ated by so ci et ies. This is in clu sive of print, on line, IEL, etc. – all me dia. A new ben e fit that is avail able for mem bers is a com pre hen sive IEEE dig i tal li brary, which is a fee based sub scrip tion service that provides access to all IEEE literature. Jan dis cussed the ma jor rev e nue streams we have from IEEE and in di cated that the bud geted in come for next year looks rea son able. IEEE is mov ing to elec tronic form with print on de mand in the fu ture. John Vig dis cussed the fact that IEEE is start ing to pro vide cus tom ized sub sets of IEL for use by small and me dium size busi nesses. IEEE is look ing at how to split the pro ceeds, es pe cially in cases of mixed cus tom pack ages.

Unfinished business consisted of two issues from last meeting, up dat ing our dig i tal ar chive, and CDs for trans ac tions. A lengthy dis cus sion en sued re gard ing var i ous op tions for CDs. Some mem bers feel that lo cal ac cess is use ful in de pend ent of whether mem bers also have on line ac cess, and that we should have an an nual up date of the dig i tal ar chive avail able for a nom i nal fee (about $5) in de pend ent of what hap pens to trans ac tions. A num ber of peo ple ex pressed the view that since so ci ety mem ber ship in cluded hardcopy Trans ac tions in the past, it should include at least one yearly CD with all Trans ac tions is sues, pref er a bly at no ad di tional cost since this should cost less than the print version did. Monthly or bi-monthly up date CDs were also dis cussed. Peo ple ev ery where will want to have some per ma nent ver sion of the pub li ca tions they had ac cess to on line while they were mem bers. There was an ac tive dis cus sion.

Lute Maleki made and Stu Fos ter sec onded a mo tion that passed (18 in fa vor, 1 op posed) That the so ci ety pro vide all members with one end of year CD containing transactions, con fer ence pro ceed ings, news let ters, stan dards, etc. that is an up date to the an nual dig i tal ar chive, at no ad di tional charge.

John Kosinski made and Clem ens Ruppel sec onded a mo tion: That Jan Brown de ter mine the ac tual pro duc tion cost of the dig i tal ar chive, and raise the price to cover pro duc tion and dis tri bu tion costs, rounded up, and place in for ma tion on the web to ex plain the new price.

A dis cus sion en sued re gard ing what should be charged for this CD. Rajesh Panda made and John Vig sec onded a sub sti tute mo tion thatpassed (13 in fa vor, 7 op posed): That the so ci ety in crease the cost for the dig i tal ar chive to sub stan tially more than enough to cover pro duc tion and dis tri bu tion costs, with price to be $60 plus ship ping. The orig i nal mo tion was then moot.

Transactions

Jian-Yu Lu presented a pre sen ta tion on the per for mance of MC which has been run ning for about 4 months now. The pro cess has re sulted in sub stan tially shorter pro cess ing times for manu scripts. Marge Yuhas re ported on the old sys tem, com ment ing that we might want to give au thors a time limit for re vi sions or it goes into a with drawn sta tus. A dis cus sion en sued re gard ing how long to al low au thors to spend re vis ing doc u ments for resubmittal.

John Kosinski made and Jan Brown sec onded a mo tion that passed (20 in fa vor, 1 op posed): That the Trans ac tion Ed i tor in

Chief and As so ci ate Ed i tor in Chief are au tho rized to no tify ev-ery one with manu scripts in the leg acy sys tem that are with the au thors and have an age of a year or more that the pa pers will be ad min is tra tively with drawn un less acted upon within one month.

Newsletter

Jan Brown is look ing for a Vice Chair, News let ter Ed i tor, and on-line news let ter ed i tor.

Nominations

Chair Stu art Fos ter dis trib uted a short writ ten re port. 2003 is an elec tion year for the UFFC Pres i dent Elect, and nom i na-tions should be re ceived by Stu by Aug 2003. Nom i na tions re-quire a letter of nomination signed by two members of ADCOM, and up to date CV, and a let ter from nom i nees.

Ferroelectrics Committee

Su san Trolier-McKinstry, Ferro elec trics VP, re ported that the 2002 Nara con fer ence was dis cussed at the last AdCom meet-ing, and she ex pects the sur plus amount of $6.7k to stay about the same. Mike Garvey sub mit ted a writ ten re port for the 2004 joint con fer ence. The 2006 meet ing will be in Ra leigh North Carolina, with Jon-Paul Maria as Gen eral Chair.

Frequency Control Committee

Lute Maleki, Fre quency Con trol VP, stated that the 2002 FC sym po sium, re ported on at the last AdCom meet ing, should have a better than ex pected sur plus. Mike Garvey pro vided a writ ten re port for 2003. The con fer ence will be held in Tampa Fl, in May 2003, and will be joint with EFTF. Mike Driscoll will be Gen eral Chair for 2005 and 2006. A MOU ap proved by the Frequency Control Standing Committee members was passed around for re view and dis cus sion.

Lute Maleki made and Jan Brown sec onded a mo tion that passed (20 in fa vor, 0 op posed): That the ADCOM ap prove the MOU sub ject to re view by IEEE Con fer ence Ser vices.

Ultrasonics Committee

Jim Green leaf, Ultrasonics VP, gave a writ ten and oral re port. Clem ens Ruppel has ac cepted an of fer to be vice-chair of the Ultrasonics Com mit tee. Clem ens gave a brief pre sen ta tion on the cur rent Mu nich meet ing (2002 IUS) with in for ma tion on so cial events. The 2004 joint meet ing has al ready been dis-cussed, and 2005 in Rot ter dam is rel a tively set, al though the venue is not set and we are look ing for a vol un teer to run the con fer ence. There is dis cus sion of hold ing the 2008 meet ing in Bejing or Nanjing.

The 2003 IUS bud get was pre sented, and a dis cus sion en-sued regarding the increase in fees and budget expenses. Herman van de Vaart made and John Kosinski sec onded a mo-tion that passed (11 in fa vor 8 op posed, one ab stain – ac cord-ing to the By laws a ma jor ity of vot ing mem bers (11) is needed to pass mo tion): To ac cept the 2003 IUS Sym po sium bud get.

Awards

Awards Chair Reinhold Lerch pro vided a writ ten re port of the 2002 award selectees for the Achievement Award and the Distinghuished Ser vice Award, the 2001 Out stand ing pa per Award for Trans ac tions.

Bernie Tittmann, Dis tin guished Lec turer and ma jor awards sub com mit tee chair, re ported that Da vid Payne is fin ish ing up w/ dis tin guished lec turer hav ing served for 2001 - 2002. Kirk Shung is serv ing for 2002 – 2003 and Steve Jefferts is serv ing for 2003 - 2004 Two in di vid u als were con sid ered for dis tin-guished lec turer fol low ing Steve Jefferts (in 2004). Pre sen ta-tions were made on be half of both can di dates, and an AdCom vote re sulted in Nava Set ter be ing se lected as dis tin guished lec turer for an 18 month term start ing in July 1, 2004 and run-ning through 2005.

Membership Services

Chair Rajesh Panda gave an oral and written re port on the mem ber ship sta tus of UFFC. He dis cussed on go ing ef forts to de velop pro mo tional ma te ri als, send ma te ri als to other con fer-ences, etc. A dis cus sion was held re gard ing the fees UFFC pays for its mem bers hav ing re cip ro cal ac cess to other so ci ety pub li ca tions, about $70-80k this year, which is over one third of the to tal mem ber ship dues for our so ci ety. This is not rea-son able and we should stop al low ing this re cip ro cal ac cess.

John Vig made and Art Ballato seconded a motion that passed (18 in fa vor, 0 op posed): If any charges for re cip ro cal ac cess to UFFC pub li ca tions oc cur then we au tho rize our pub-li ca tions VP to no tify the ap pro pri ate so ci et ies that we are no lon ger go ing to al low re cip ro cal ac cess start ing in 2003.

Se nior Stu dent Rep re sen ta tive Ray Brennan spoke about mem-ber ship pro mo tional items, a poster and post cards of fi nal de sign were shown. A flier/hand out with in for ma tion sim i lar to the poster has also been gen er ated. These ma te ri als will be sent to uni ver si-ties, con fer ences, etc. A booth will dis play this ma te rial here in Munich. Jan Brown said the mem ber ship com mit tee should be com mended on get ting this done well and in a timely man ner.

Standards

Chair Art Ballato pro vided a writ ten re port on the prog ress be ing made on sev eral stan dards, and brought up the is sue of hav ing a group of peo ple who were sub mit ted to IEEE as vol un teers to work on one stan dard be ing re jected be cause they had not paid a $10 fee to be on the rel e vant stan dards com mit tee. Art sug gested that per haps we should con sider pub lish ing the in for ma tion as

some thing other than an IEEE stan dard and put it on the web. A dis cus sion en sued over whether AdCom should pay the $10 fee for UFFC stan dards vol un teers so that IEEE will ac cept them and al low this to be come an IEEE stan dard, or whether we should pub lish the re sults on the web, which would al low oth ers to access it with out IEEE charg ing. If it is an IEEE stan dard, we would be re stricted from pub lish ing it on the web site, and any one that wants it would have to pay to get ac cess to it. On the other hand, it was sug gested that if it is not an IEEE stan dard, it will in fact not be a stan dard that is used. The $10 fee ap pears to be es sen tially a "tax", which vol un teers must pay in or der to have the op por tu nity to work on stan dards.

Su san Trolier-McKinstry made and Art Ballato sec onded a mo tion that passed (15 in fa vor, 1 op posed, 1 ab stain): That UFFC-S AdCom in form the stan dards as so ci a tion that we are philo soph i cally op posed to the stan dards as so ci a tion im posing a $10 fee for IEEE mem bers to be al lowed to work on standards development, and to the standards association not approving technically qualifiedindividuals for balloting on stan dards un less they are IEEE mem bers and also stan dards associationmembers.

Jan Brown made a mo tion sec onded by John Kosinski that passed (14 in fa vor, 3 op posed, 1 ab stain): That the UFFC-S AdCom, if nec es sary in the ap pli ca ble year, pay the $10 membership fee for stan dards as so ci a tion mem ber ship on be half of the UFFC mem bers who would be vot ing in the year the standard is ready for submittal.

Fellows

Chair Rich ard White pro vided a writ ten re port which Jackie Hines pre sented.

Education

Rob ert Schwartz, Chair of the ed u ca tion com mit tee sent Ahmad an e-mail re port sum ma riz ing the ed u ca tion ac tiv i ties at HQ. This will be re ported on fur ther at the next AdCom meet ing.

HistoricalCommittee

Fred Hickernell men tioned the his tor i cal in ter views and dates that were put into the news let ter. Fred put in some of what he thinks the his tor i cal com mit tee should do. He is look ing for more in ter ested peo ple, to help with pre serv ing a lot of in teresting his tory, both from a tech ni cal and a so ci ety per spective, and would wel come any one who would like to join this ef fort.

Long Range Plan ning

John Vig pre sented the high lights of a long range plan, in cluding bring ing new blood into AdCom and en forc ing term lim its and establishing a conferences/exhibits chair. A discussion en sued re lat ing to con fer ences and how MTT han dles con trol over con fer ences. John Vig stated that im prov ing the fi nan cial health of the UFFC-S is crit i cal. We should know the cost impact of each de ci sion made at AdCom, and build up re serves and main tain them at 70% of the an nual UFFC-S ex pense budget. Fi nally, should UFFC be look ing out for new tech nol ogies, per haps MEMs?

UFFC-SRepresentatives

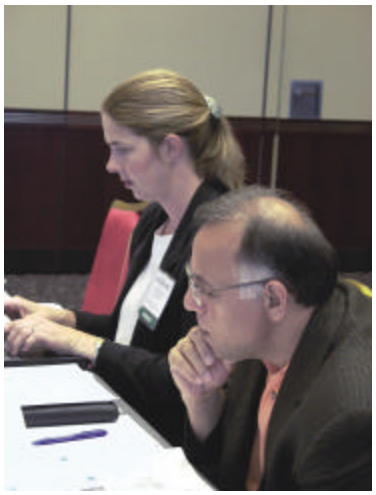
Ahmad Sa fari gave a re port from Leon ard Bond (rep re sen tative to the Nanotechnology Council). This Council is supported by 20 so ci et ies of which we are one. The first is sue of IEEE Transactions on Nanotechnology was published on March 1, 2002. A Dis tin guished lec turer pro gram has been established. A 2003 Nanotechnology Conference is set for SanFrancisco in Sep tem ber 2003.

New Busi ness:

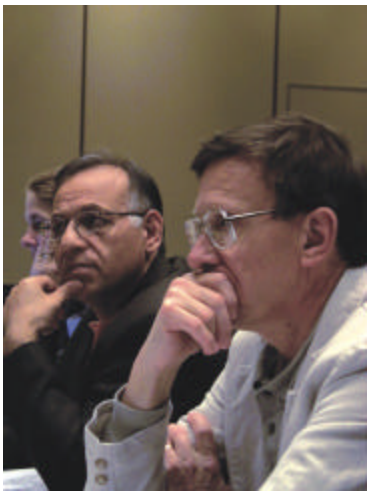
1. Bernie Tittmann –passed around leaflet for central PA IEEE sec tion. They have monthly meet ings with speak ers, sev eral chap ters, do ing well.
2. **Ferroelectricscommitteereview** – Gerry Bless ing stated that sev eral AdCom mem bers par tic i pated in the re view, and Su san Trolier-McKinstry re sponded to a num ber of ques tions they asked. Su san pro vided about 20 pages of writ ten re port and oral in for ma tion re lat ing to com mit tee con tent, sym po sium or ga nization, pub li ca tions. Stan dards, re cent ad vances within field, and rec om men da tions for the fu ture were also dis cussed. The com mit tee has 37 peo ple, which is fairly large, with in ter national rep re sen ta tion from ferro elec tric groups world wide. Susan be gan her term as VP of Ferro elec trics last Jan u ary, and the term is re new able per the by laws. There will be more ac tiv ity to make Mem bers into Sr. Mem bers so they will be come el i gible for fel low sta tus. There is con cern that Ferro elec trics is still trying to be come in volved with the so ci ety, es pe cially as far as pub li ca tions are con cerned. The UFFC Trans ac tions has in the

Ahmad Sa fari (l) pre sent ing Ray mond Brennan with a cer tif i cate for AdCom ser vice.

We're in Fa vor - Kiyoshi Nakamura, Ray Brennan, Reinhold Lerch, Bernie Tittmann.



Jackie Hines and Ahmad Sa fari.



Ahmad Sa fari and Gerry Bless ing looking very se ri ous.

past not been a wel com ing site for a lot of the ferro elec trics work. There was dis cus sion of hav ing a sep a rate ferro elec trics pub li ca tion, but that is on the back burner.

3. We have been in vited to par tic i pate at the first bio med i cal im-ag ing re search work shop, spon sored by four so ci et ies asked to as sign a UFFC rep for this. Bernie Tittmann. vol un teered.
4. John Kosinski noted that cre ation of a new VP re quires an amend ment of con sti tu tion, by laws, and de le tion of one of the ex-oficio mem bers if new VP is made vot ing. There is within the by laws a pro ceed ings stand ing com mit tee (which is currently non-functioning) whose goals correspond to many of John's re quire ments. Should we ex pand the scope of the pro ceed ings com mit tee rather than have a new VP?
5. John Kosinski also noted that we cur rently have tre men-dous re sources on the Web in Eng lish. He would like us to so licit, in for eign lan guages if nec es sary, much of what was done over seas for worth while pub li ca tions in clud ing clas-sic ref er ences. Should we put a call for clas sic ref er ences, in de pend ent of lan guages, in sev eral news let ters? John Vig noted that if we ask for sug ges tions, the re spon si bil ity is then on us to ob tain copy right re leases. Why not ask for vol un teers that will con tact the au thor and or pub lisher to get the rights to put the books on the web site?
6. Ahmad presented certificates of appreciation to the four outgoing elected AdCom members, Clemens Ruppel, Mike Driscoll, Tom Parker, and Lew Brown (Lew was not pres ent, we will mail his cer tif i cate).
7. Cre ation of new prod uct safety so ci ety within IEEE (PSS) is on go ing – they need a UFFC rep re sen ta tive to look into elec tri cal and re lated safety is sues.

The meet ing was ad journed at 5:08 pm, 7 June 2002.

THE NEXT UFFC-S ADCOM MEETING will be held Sunday May 4, 2002 in Tampa in con junc tion with and pre-ced ing the 2003 FCS/EFTF Sym po sium in Tampa, Florida.

Jac que line H. Hines
UFFC-S Sec/Treas

President's Message **Con tin ued from page 2**

As part of the stra te gic plan ning ini tia tive, which was put into mo tion sev eral years ago, we started to re view and eval-u ate the ac tiv i ties of the Stand ing Com mit tees in depth. The re views and eval u a tions will be based upon com mit tee mem-ber ship and struc ture, sym po sia, pub li ca tions, web ac tivi ties and fu ture plans. For the first time, a com mit tee of five mem-bers has re viewed the Ferro elec tric Com mit tee's ac tiv i ties at the Ultrasonics meet ing in Mu nich, and found their ac tiv i ties fa vor able. In 2003, the same com mit tee will re view and eval-u ate the ac tiv i ties of the Fre quency Con trol and Ultrasonics Com mit tees us ing the same stan dards men tioned above.

In clos ing, I would like to stress out and re quest from you for as much par tic i pa tion as pos si ble in UFFC ac tiv i ties and func tions as peo ple are the strength of sup port of all in sti tu-tions, es pe cially this of ours. Please do not hes i tate to com mu-nicate your comments and thoughts to me. Your feedback would be most ap pre ci ated.

This year, we are looking forward to two ma jor in ter na-tional symposia, namely, the Fre quency Con trol meet ing in Tampa Florida and the Ultrasonics meet ing in Hawai'i. I am con fi dent that these meet ings will be much of a suc cess as the ones that preceded them in 2002. I hope to see you all in Tampa or Hawai'i this year.

Best re gards,
Ahmad Sa fari
President
E-mail: sa fari@rci.rutgers.edu

IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society

Administrative Committee & Associates

SOCIETY OFFICERS

PRESIDENT	Ahmad Sa fari	*Rutgers University*
PRESIDENT-ELECT	Ger ald V. Bless ing	*Natl. Inst. of Stan dards & Tech.*
VP, FERRO ELECTRICS	Su san Trolier-McKinstry	*The Penn syl va nia State Uni ver sity*
Vice-VP, Ferro elec trics	Steve Pil grim	*Al fred Uni ver sity*
VP, FRE QUENCY CON TROL	Lute Maleki	*Jet Pro pul sion Lab o ra tory*
Vice-VP, Fre quency Con trol	Don Sullivan	*NIST*
VP, ULTRASONICS	Clem ens Ruppel	*EPCOS AG*
Vice-VP, Ultrasonics	Va cant	
VP, PUB LI CA TIONS	Jan Brown	*JB Con sult ing*
Vice-VP, Pub li cations	Don Yuhas	*Industrial Mea sure ment Systems*
SECRETARY-TREA SURER	Jac que line H. Hines	*J. H. Hines Con sult ing*

ELECTED ADMINISTRATIVE COMMITTEE MEMBERS

2001-2003	Gordon Hay ward, *Uni ver sity of Strath clyde*	2002-2004	Kiyoshi Nakamura, *Tohoku Uni ver sity*
2001-2003	Jac que line H. Hines, *J. H. Hines Con sult ing*	2003-2005	Mathias Fink, *Laboratoire Ondes et Acoustique ESPCI*
2001-2003	John A. Hossack, *Uni ver sity of Vir ginia*		
2001-2003	Wal ter A. Schulze, *Al fred Uni ver sity*	2003 - 2005	R. Mi chael Garvey, *Symmetricom*
2002-2004	Mauricio Pereira da Cunha, *Uni ver sity of Maine*	2003 - 2005	Kullervo Hynynen, *Brigham and Women's Hos pi tal, Harvad Med i cal School*
2002-2004	Bruce A. Tuttle, *Sandia Na tional Laboraories*		
2002-2004	John A. Kosinski, *U. S. Army Com mu ni ca tions-Electronics Command*	2003 - 2005	Tom Shrout, *Penn syl va nia State Uni ver sity*

STANDING COM MIT TEE CHAIRS & VICE-CHAIRS

AWARDS	Reinhard Lerch	*Uni ver sity of Erlangen*
Awards Vice-Chair*	Bernhard R. Tittmann	*The Penn syl va nia State Uni ver sity*
EDUCATION	Rob ert W. Schwartz	*Clemson Uni ver sity*
FELLOWS*	Rich ard M. White	*Uni ver sity of Cal i for nia, Berke ley*
FI NANCE	Herman van de Vaart	*VDV Associates*
Fi nance Vice-Chair*	Jac que line H. Hines	*J. H. Hines Con sult ing*
HISTORIAN*	Fred S. Hickernell	*Motorola (re tired))*
LONG RANGE PLAN NING*	John R. Vig	*U. S. Army Com mu ni ca tions-Electronics Command*
MEMBERSHIP SER VICES	Rajesh K. Panda	*Philips Med i cal Systems*
Chap ters Vice-Chair*	Eliz a beth M. Herrera	*Diebold In cor po rated*
NOMINATIONS	Steve Pil grim	*Al fred Uni ver sity*
Nom i na tions Vice-Chair*	Vacant	
STAN DARDS	Ar thur Ballato	*U. S. Army Com mu ni ca tions-Electronics Command*
Stan dards Vice-Chair*	Eva Ferre-Pikal	*Uni ver sity of Wy o ming*
PUBLICATIONS	Jan Brown	*JB Con sult ing*
Pub li ca tions Vice – Chair*	Don Yuhas	*Industrial Mea sure ment Systems*
PUBLICITY AND EX HI BITION*	Sorah Rhee	*Penn syl va nia State Uni ver sity*

TRANSACTIONS EDITOR *Jian-Yu Lu	*Uni ver sity of To ledo*	
Trans. Associate Editor-in-Chief*	Mar jo rie P. Yuhas	*In dus trial Mea sure ment Sys tems, Inc.*
NEWSLETTER EDITOR*	Jan Brown	*JB Con sulting*
Newsletter Vice-Editor*	Vacant	
WEB ED I TOR in CHIEF*	Sorah Rhee	*Penn syl va nia State Uni ver sity*
Web Ed. for Ul tra sound*	Rich ard Y. Chiao	*GE Cor po rate R&D*
Web Ed. for Ferro elec trics*	Sorah Rhee	*Penn syl va nia State Uni ver sity*
Web Ed. for Freq. Con trol*	John R. Vig	*U. S. Army Com mu ni ca tions-Elec tron ics Com mand*
Sr. Past Pres i dent (2000 – 2002)	John R. Vig	*U. S. Army Com mu ni ca tions-Elec tron ics Com mand*
Jr. Past Pres i dent (2002 – 2004)	Fred S. Hickernell	*Motorola (re tired)*
Sr. Stu dent Mem ber* (2001-2002)	Eunki Hong	*The Penn syl va nia State Uni ver sity*
Jr. Stu dent Mem ber* (2002-2003)	Asha Hall	*Rutgers Uni ver sity*
*Non-voting po si tion		

SUB-COMMITTEE MEMBERS

STANDARDS		
Ferro elec trics	Su san Trolier-McKinstry	*The Penn syl va nia State Uni ver sity*
Loss in Acous tic Ma te ri als	Stew art Sherrit	*Jet Pro pul sion Lab o ra tory*
Piezo elec tric Crystals	B. Hanson	Piezo Crys tal Com pany
	Thryg R. Meeker	
Piezomagnetic Tech nol ogy	Stan ley L. Ehrlich	*Stan Ehrlich As so ci ates*
Sen sors, Actu ators & Trans ducers	Ryszard Lec	Drexel Uni ver sity
	Ste phen J. Mar tin	*Sandia Na tional Lab o ra tory*
Superconductivity	Moises Levy	Mich igan State Uni ver sity
	Brage Golding	
Surf. Acous tic Wave De vices	Pi erre Dufilie	*Thomson Com po nents/Spe cial Prod ucts*
Time & Fre quency	Eva Ferre-Pikal	Uni ver sity of Wy o ming
	John R. Vig	U. S. Army Comm.-Elec. Com mand

DISTINGUISHED LECTURERS

July 2001 – De cem ber 2002	Da vid A. Payne	*Uni ver sity of Il li nois, Ur bana*
July 2002 – De cem ber 2003	K. Kirk Shung	*The Penn syl va nia State Uni ver sity*
July 2003 – De cem ber 2004	Ste ven R. Jefferts	*Na tional In sti tute of Stan dards & Tech nol ogy*
July 2004 – De cem ber 2005	Nava Set ter	*EPFL Swiss Fed eral In sti tute of Tech nol ogy*

SYMPOSIA LEADERSHIP

ULTRASONICS SYMPOSIA	Clem ens Ruppel	*EPCOS AG*
2002 Mu nich, Ger many	Clem ens C. W. Ruppel	*EPCOS AG*
2003 Ho no lulu, Ha waii	James F. Green leaf	*Mayo Clinic*
	Wil liam D. O'Brien, Jr.	Uni ver sity of Il li nois, Ur bana
2004 Mon treal, Can ada (Joint UFFC Sym po sium)	R. Mi chael Garvey	*Symmetricom, Tech nol ogy Re source Cen ter*
2005 Rot ter dam, The Neth er lands	Ton A. van der Steen	*Tho rax Cen tre*
FERROELECTRICS SYMPOSIA	Su san Trolier-McKinstry – chair	*The Penn syl va nia State Uni ver sity*
2002 Nara, Kansai, Ja pan	Tadashi Takenaka	*Sci ence Uni ver sity of To kyo*
	Da vid Payne	*Uni ver sity of Il li nois, Ur bana*
2004 Mon treal, Can ada (Joint UFFC Sym po sium)	R. Mi chael Garvey	*Symmetricom, Tech nol ogy Re source Cen ter*
FRE QUENCY CON TROL SYM.	Lute Maleki – *chair*	*Jet Pro pul sion Lab o ra tory*
2002 New Or leans, LA	Errol P. EerNisse	*Quartzdyne, Inc.*

2003 Tampa Bay, FL	R. Mi chael Garvey	*Symmetricom, Tech nol ogy Re source Cen ter*
	R. Besson	*Lab. De Chrono. Electr. Piezoelec.*
2004 Mon treal, Can ada		
(Joint UFFC Sym po sium)	R. Mi chael Garvey	*Fre quency & Time Sys tems Inc.*
2005 & 2006	Mi chael M. Driscoll	*Northrup Grumman Corp.*

UFFC-SREPRESENTATIVES

Com mit tee on Man & Ra di a tion	Vacant	
Educational Activities	Vacant	
Jour nal of Lightwave Tech nol ogy	Da vid L. Hecht	*Xerox Cor po ra tion, PARC*
	John N. Lee	*Naval Research Labo ratory*
Sen sors Coun cil	Dragan Damjanovic	*EPFL*
Superconductivity Council	Moises Levy	Uni ver sity of Wis con sin, Mil wau kee
	Brage Golding	*Mich i gan State Uni ver sity*
Trans ac tions on Med i cal Im ag ing	Ahmed Amin	*Na val Un der sea War fare Cen ter*
IEEE Pro fes sional Activ i ties		
Com mit tee: 'PACE'	Jan Brown	*JB Con sult ing*
Pub li ca tions Board	Jian-yu Lu	*Uni ver sity of To ledo*
TAB New Tech nol ogy Di rec tions	John R. Vig	*U. S. Army Com mu ni ca tions-Elec tron ics Com mand*

UFFC AWARDS

The Chair of the UFFC Awards Com mit tee, Reinhard Lerch, with the help of sev eral com mit tees makes rec om men da tions to the AdCom for four ma jor so ci ety wide awards, namely, the Achievement Award, the Dis tin guished Ser vice Award, the Outstanding Paper Award, and the Distinguished Lecturer. Dr. Lerch re ports on the 2002 awards.

UFFC Achievement Award

The Achieve ment Award is the high est So ci ety-wide award pre sented to a mem ber in spe cial rec og ni tion of out stand ing con tri bu tions. Se lec tion cri te ria in clude sig nif i cant tech ni cal pub li ca tions in the field of ultrasonics, ferro elec trics, or fre quency con trol, as well as con tri bu tions to these tech ni cal fields, and ser vice to the So ci ety. The win ner is se lected by the Of fi cers and the Awards Com mit tee from nom i na tions sub mit ted by the gen eral mem ber ship. The award con sists of an hon o rar ium of $2,000, a plaque, and a cer tif i cate. Pre sen ta tion is usu ally at one of the So ci ety's ma jor sym po sia. The first award was pre sented in 1980.

2002 UFFC Achieve ment Award Re cip i ent

The UFFC Society congratulates the winner of the 2002 UFFC Achieve ment Award**: Dr. Jack A. Kusters**, who just re tired from Hewlett Packard. The cer tif i cate and the plaque of his award reads:

"For his valu able and nu mer ous con tri bu tions to the un der stand ing and deep in sight into the work ing mech a nisms of fre quency control devices and his productive work on many Fre quency Con trol and IEEE com mit tees."

Dr. John R. Vig will pres ent the in tro duc tory re marks for Dr. Kusters' award at the Fre quency Con trol Sym po sium in Tampa, FL, in May 2003.

John Vig (cen ter) ac cept ing Achieve ment Award on be half of Jack Kusters from Reinhard Lerch and Ahmad Sa fari.

Achieve ment Award Nom i na tions

Nom i na tions may be sub mit ted at any time. Any mem ber may sub mit a nom i na tion by send ing the nom i nee's name and a de scrip tion of that per son's main con tri bu tions, along with the submitter's own name and ad dress to:

Prof. Dr. -Ing. Reinhard Lerch
Chair, UFFC-S Awards Com mit tee
Friedrich-Alexander-University Erlangen-Nuremberg
De part ment of Sen sor Tech nol ogy
Paul-Gordan-Str. 3/5
91052 Erlangen
Germany
Fon: +49 9131 85 23131
Fax: +49 9131 85 23133
e-Mail: reinhard.lerch@lse.e-technik.uni-erlangen.de

Past Re cip i ents of the Achieve ment Award

The UFFC Achieve ment Award was first pre sented in 1980.

Eric L. Adler, 2001: *For his ex ten sive con tri bu tions to the un der stand ing and anal y sis of bulk, sur face and pseudo-sur face acous tic waves in sin gle crys tals and lay ered struc tures, and his years of ser vice to the So ci ety.*

John R. Vig, 2000: *For his cre ative and in no va tive re search on quartz res o na tors and sen sors, and for his many years of ser vice and lead er ship in the IEEE UFFFC So ci ety.*

Thomas E. Parker, 1999: *For his orig i nal con tri bu tions to high-sta bil ity SAW os cil la tors and his lead er ship of the pro fes sional com mu nity world wide for in creas ingly more pre cise time stan dards and time trans fer.*

Wil liam D. O'Brien, Jr., 1998: *For lead er ship in es tab lish ing a broad knowl edge of the in ter ac tion of ul tra sound with bi o log i cal tis sue, in clud ing bioeffects, exposimetry and clin i cal stan dards, and for fos ter ing in his stu dents the joy of dis cov ery.*

Noriyoshi Chubachi, 1997: *For his sig nif i cant con tri bu tions in piezoelectric materials, in ultrasonic mi cros copy, and in ma te ri als char ac ter iza tion; and for his ded i ca tion to en cour ag ing and guid ing young en gi neers in ultrasonics re search.*

L. Eric Cross, 1996: *For his many con tri bu tions to the the o ret i cal un der stand ing and en gi neer ing ap pli ca tions of ferro elec tric and antiferroelectric ma te ri als, and for his world wide lead er ship of the ferro elec trics com mu nity.*

Fred S. Hickernell, 1995: *For his com pre hen sive re search and de vel op ment of di elec tric and pi ezo elec tric films for acous ti cal and op ti cal mi cro elec tronic de vices, and for ed it ing the UFFC-S News let ter since 1977 with en thu si asm and vi sion.*

Ar thur W. Warner, Jr., 1995: *For his nearly 60 years of pi oneer ing and wide-rang ing con tri bu tions to the de sign and fab ri ca tion of high-sta bil ity quartz res o na tors.*

Nobuo Mikoshiba, 1994: *For his de vo tion to en gi neer ing ed u ca tion and his leadership in physical acoustics, photoacoustics and acoustoelectronics, and for establishing the first UFFC-S Chap ter in Ja pan.*

Harry F. Tiersten, 1993: *For developing several rational theories for analyzing the electroelastic behavior in anisotropic crys tals, in clud ing pi ezo elec tric, non lin ear and en ergy-trap ping ef fects for bulk and sur face acous tic waves.*

Ar thur Ballato, 1992: *For his wide-rang ing con tri bu tions to the fun da men tal un der stand ing, in both the ory and prac tice, of pi ezo elec tric ma te ri als and their ap pli ca tion to res o na tors, filters and frequency con trol de vices, and for his en er getic pur suit of IEEE stan dards.*

Ger ald W. Farnell, 1991: *For his ded i ca tion to en gi neer ing ed u ca tion, his com pre hen sive re search on acous tic prop a ga tion and waveguiding in anisotropic materials, and his long-term com mit ment to the So ci ety and IEEE.*

Cecil E. Land, 1990: *In rec og ni tion of his cre ative and in no va tive re search on ferro elec tric and elec tro-op tic phe nom ena in ce ramic ma te ri als and de vices, and his many years of service to the So ci ety.*

Eric A. Ash, 1989: *For his de vo tion to ed u ca tion and his in no va tion and lead er ship in sur face acous tic waves, in te grated op tics and scan ning acous tic mi cros copy.*

Richard M. White, 1988: *For launching innovative and fruit ful ideas in ultrasonics by mak ing piv otal con tri bu tions to theory and experiment, in photoacoustics, surface acoustic wave de vices and sen sors.*

Thrygve R. Meeker, 1987: *For pioneering contributions, ranging from concept to practical implementation, in the fields of bulk wave res o na tors and dispersive de lay lines; and for dil i gently pur su ing stan dards on pi ezo elec tric crys tals.*

Cal vin F. Quate, 1986: *For com bin ing the con cepts of me chan i cal scan ning and the sin gle-sur face dif frac tion-lim ited lens to cre ate the Scan ning Acous tic Mi cro scope.*

Rich ard C. Williamson, 1985: *For pioneering contributions to sur face wave sig nal pro cess ing de vice tech nol ogy, through conception, design, characterization, practical fabrication and sem i nal ap pli ca tion of re flec tive-grat ing struc tures.*

Gordon S. Kino, 1984: *For his vast sci en tific con tri bu tions in nu mer ous fields and his ded i ca tion to stu dent in volve ment in sonics and ultrasonics tech nol ogy.*

Bertram A. Auld, 1983: *For sci en tific ex cel lence and dis tinc tion through the o ret i cal con tri bu tions to ultrasonics.*

Her bert J. Shaw, 1982: *For many con tri bu tions, through re search and ed u ca tion, to ultrasonics tech nol ogy.*

Rob ert Adler, 1981: *For in sight, in no va tion, and lead er ship given to ultrasonics tech nol ogy.*

John de Klerk, 1980: (Ci ta tion is not re corded in any doc u ment of the So ci ety, but ci ta tion most likely ac knowl edged de Klerk's de vel op ment of the first Sur face Acous tic Wave de vices to be widely used in ra dar sys tems [13-bit Barker phase code], and his foresight in establishing and editing the Ultrasonics Sym po sium Pro ceed ings.)

UFFC Distinguished Service Award

The Dis tin guished Ser vice Award rec og nizes long-term support of the So ci ety's ac tiv i ties. Rec og ni tion is given to those who in no vate new So ci ety pro grams, ad min is ter ma jor Com mit tees, man age So ci ety func tions, or pro mote the So ci ety's ar eas of tech ni cal in ter est to the larger com mu nity. The re cip i ent usu ally has served for many years with sus tained par tic i pation in the So ci ety's man age ment. Se lec tion is made by the Of fi cers and the Awards Com mit tee from nom i na tions sub mit ted by the gen eral mem ber ship. The award con sists of an hon o rar ium of $2,000, a plaque and a cer tif i cate. Pre sen ta tion is usu ally at one of the So ci ety's ma jor sym po sia. The first award was pre sented in 1997.

2002 Dis tin guished Ser vice Award Re cip i ent

The IEEE UFFC 2002 Dis tin guished Ser vice Award was presented dur ing the open ing cer e mony of the Mu nich Sym posium. The UFFC So ci ety is proud to an nounce its re cip i ent: **Dr. Jan Brown**, Prin ci pal and Founder of JB Con sult ing in Austin, TX, USA. The plaque and the certificate of Dr. Brown's award reads:

"In rec og ni tion of her long-term ded i ca tion to the UFFC So ci ety, as well as the IEEE in its en tirety, for her or ga ni za tional lead er ship as past pres i dent and her in sight ful con-

Dis tin guished Ser vice Award win ner, Dr. Jan Brown.

Fred Hickernell pre sent ing the Dis tin guished Ser vice Award to Jan Brown with Ahmad Sa fari.

tri bu tions in many po si tions en abling the UFFC So ci ety to broaden its ho ri zons."

This award was pre sented by Dr. Fred Hickernell, an other former president of the UFFC Society. He appreciated Dr. Brown's ex cel lent sci en tific work within the ul tra sonic com-mu nity as well as her long-term ser vice for the UFFC So ci ety.

UFFC Dis tin guished Ser vice Award Nom i na tions

Nom i na tions may be sub mit ted at any time. Any mem ber may sub mit a nom i na tion by send ing the nom i nee's name and a de-scrip tion of that per son's main con tri bu tions, along with the submitter's own name and ad dress to:

Prof. Dr. -Ing. Reinhard Lerch
Chair, UFFC-S Awards Com mit tee
Friedrich-Alexander-UniversityErlangen-Nuremberg
De part ment of Sen sor Tech nol ogy
Paul-Gordan-Str. 3/5
91052 Erlangen
Germany
Fon: +49 9131 85 23131
Fax: +49 9131 85 23133
e-Mail: reinhard.lerch@lse.e-technik.uni-erlangen.de

Past Re cip i ents of the Dis tin guished Ser vice Award

The Dis tin guished Ser vice Award was first pre sented in 1997.

Arthur Ballato, 2001: *For his insightful organizational lead er ship en com pass ing all fields of in ter est of the So ci-ety, with special appreciation for his diligent pursuit of IEEE Stan dards.*

Roger H. Tancrell, 2000: *In rec og ni tion of his 15 years of ex-cellent chairmanship of the Awards Com mit tee, and for his long-term ded i ca tion and lead er ship of the UFFC So ci ety.*

Bruce R. McAvoy, 1999: *In rec og ni tion of his vi sion and en-terprise in editing the Ultrasonics Symposium Proceedings and his ded i ca tion to strength en ing com mu ni ca tions with the wider IEEE com mu nity.*

Herman van de Vaart, 1998: *For three de cades of lead er-ship of the UFFC So ci ety re vamp ing the So ci ety's op er a tions in clud ing fi nance, con sti tu tion and awards, en abling the So ci-ety to broaden its ho ri zons.*

Gerald W. Farnell, 1997: *In recognition of his long-term ded i ca tion to the UFFC So ci ety, and for his gen tle, yet de ter-mined, nurturing of the Ultrasonics Committee and Ultrasonics Sym po sium.*

UFFC Distinguished Lecturer Award

The Dis tin guished Lec turer rep re sents the UFFC So ci ety by giv ing lec tures world wide to the larger tech ni cal com mu nity. The sub ject of the lec ture must be of cur rent in ter est and the lec turer must be a prom i nent con trib u tor in the field of the lec-ture. The speaker is se lected for speak ing style, prom i nence in the topic, and will ing ness to com mit sig nif i cant time and en-ergy to prep a ra tion, travel and lec tures. The Lec turer is se-lected by the Distinguished Lecturer Subcommittee of the UFFC-S Awards Com mit tee from nom i na tions re ceived from the gen eral mem ber ship. Pre sen ta tion is usu ally at one of the So ci ety's ma jor sym po sia.

The award con sists of a cer tif i cate, and re im burse ment for an in ter na tional lec ture tour.

You are en cour aged to in vite the Dis tin guished Lec turer to your Chap ter or in sti tu tion.

2002 - 2003 Dis tin guished Lec turer

Dr. K. Kirk Shung
K. Kirk Shung, pro fes sor
Department of Biomed i cal Engineering
500 Olin Hall
Uni ver sity of South ern Cal i for nia
Los An geles, CA 90089-1451
e-mail: kkshung@usc.edu

Ul tra sound: an un ex plored tool for blood flow vi su al iza tion and hemodynamic mea sure ments

Ul tra sonic scat ter ing by blood has been stud ied both the o-ret i cally and ex per i men tally for many years for the pur-pose of a better characterization of the performance of

Dr. K. Kirk Shung
2002-2003 UFFC
Distinguished Lecturer

ultrasonic Doppler flow and imaging devices. In the course of these in ves- tigations it became clear that ul tra sonic scat ter ing from blood or or echogenicity of blood is critically related to the hematological and hemodynamic properties of blood. It can be af- fected by hematocrit, plasma protein con cen- tra tion, flow rate and flow cycle duration, to name just a few parameters. The experimental efforts have been par al leled by the o ret i cal de vel op ments that suc- cess fully pre dict many ex per i men tal ob ser va tions.

An un ex pected con clu sion from this work is that ul tra- sound ap pears to be a to tally un ex plored and ig nored tool for blood flow visualization and hemodynamic mea sure- ments. Two unique hemodynamic phenomena that have never been reported in the hemodynamic literature have been ob served: the black hole, a low echogenic zone in the cen ter stream of whole blood flow ing in a blood ves sel un- der steady flow and the col laps ing ring, an echogenic ring ap pear ing near the pe riph ery of a ves sel at the be gin ning of a flow cy cle, con verg ing to ward the cen ter, and even tu ally col laps ing dur ing pulsatile flow. They are be lieved to be re- sulted from the spa tial and tem po ral vari a tions of the shear rate in the blood stream. With the re cent tech ni cal ad vances in clud ing stan dard B-mode, color Dopp ler, power Dopp ler, and B-flow im ag ing, clin i cal re ports of ob serv ing sim i lar phenomena in vivo on human patients begin to appear. These are ex cit ing ev i dences to show case the vi a bil ity and ef fec tive ness of ul tra sound as a tool for blood flow vi su al- iza tion and quan ti ta tive mea sure ments of hemodynamic pa- rameters. Ultrasound is much superior than current tech nol o gies such as op ti cal trac ing of flu o res cent par ti cles in that it can pen e trate light opaque struc tures. How ever, it must be re al ized that much ef fort for ad vo cat ing the mer its of ul tra sound is needed be fore it will be rec og nized and ac- cepted by the hemodyamics com mu nity.

In this talk, a his toric dis cus sion of these de vel op ments, re- sults from re cent stud ies, and a per spec tive of the fu ture will be given.

Feel Free to con tact Dr. Shung to sched ule a visit to your area.

Dr. Shung re ports

A trip was made to Ja pan and Ko rea be tween Oc to ber 30 and Nov. 14, 2002. Three lec tures were made in Ko rea. Two lec- tures were given at Pukyong Na tional Uni ver sity at Pu san, Ko rea. One was an in vited talk for the Acous ti cal so ci ety of Ko rea an nual meet ing. Pu san is a beau ti ful city lo cated right on the coast. My wife, Linda, and I were able to stroll along the beach ev ery morn ing while we were there. The trip to Pu san was hosted by Dr. Kang-Lyeol Ha, professor of Phys ics at Pukyong na tional Uni ver sity.

A side trip while vis it ing Dr. Kang-Lyeol Ha, Kirk and Linda Shung in Pu san, Ko rea

One lec ture was de liv ered at Se oul Na tional Uni ver sity in Se oul hosted by Koeng-Mo Sung, pro fes sor of elec tri cal en gi- neer ing. On Nov. 8, a lec ture was given at the Jap a nese Ul tra- sonic Elec tron ics Con fer ence at Kanazawa, Ja pan, which is a his toric city. My wife and I were able to tour the park in the cen tral city on a sunny day where there was a beau ti fully main- tained Jap a nese gar den and cas tle.

Three more lectures were given at Aloka and Toshiba which are lo cated near To kyo and at Tohoku Uni ver sity in Sendai. Dr. Toshiyuki Matsunaka who treated me with an el e- gant tra di tional Jap a nese cui sine con sist ing of many courses hosted my trip to Aloka Com pany. The lec ture at Toshiba be- came possible because of a last minute effort of Dr. Joerg Schlegel, a Ger man Sci en tist work ing at Toshiba who picked us at the train sta tion and showed us around.

The last leg of the trip was Tohoku Uni ver sity. In ad di tion to giv ing the lec ture, I was able to tour the lab o ra to ries of Profs. Kiyoshi Nakamura, Hiroshi Kanai, Jun-ichi Kushibiki, and Ken Yamada. The work car ried out there is most im pres sive. I learned a great deal. The visit to Tohoku Uni ver sity ended with a din ner at terrific traditional Japanese restaurant. Prof. Noriyoshi Chubachi joined us for din ner also. Prof. Ken Yamada me tic u- lously ar ranged the whole Jap a nese trip. I owe him many thanks.

A trip was also made in No vem ber to Se at tle. Dr. Roy Mar tin, Ap plied Phys ics Lab o ra tory, Uni ver sity of Wash- ington, hosted the lec ture. I was treated with a de light ful meal at Ivar's Salmon House near the wa ter front by Roy and his lovely wife Darlene.

An other lec ture was given at Chung-Yuan Chris tian Univer sity in Tai wan on De cem ber 10 hosted by Prof. S.H. Wang, associate pro fes sor of Bio med i cal En gi neer ing. There were about 80 stu dents and fac ulty in at ten dance.

2003 – 2004 Dis tin guished Lec turer

Dr. Ste ven R. Jefferts
Na tional In sti tute of Stan dards & Tech nol ogy
NIST - Time and Fre quency Di vi sion
325 Broad way
Boul der, CO 80305
jefferts@boulder.nist.gov

Atomic Clocks: Past, Pres ent and Fu ture

Atomic Clocks have be come ubiq ui tous in mod ern elec tronic sys tems. Mod ern nav i ga tion sys tems, such as the global po si-

Dr. Steve Jefferts
2003-2004 UFFC
Dis tin guished Lecturer

tioning system (GPS), and wide-bandwidth communication sys tems are ex am ples of two systems which cannot exist without the long-term frequency-stability offered by atomic clocks. Commercially avail able atomic clocks range from Ru bid ium based os cillators, which cost around $1000 with thousands of units per year produced, to Hydrogen masers costing $250,000 with a yearly production of a handful. Finally lab o ra tory based atomic clocks using sophisticated laser-cooling tech niques have been built in a few laboratories around the world. These pre mier atomic clocks of fer frac tional fre quency ac curacy at the 10^{-15} level, equiv a lent to one sec ond in 31 mil lion years.

La ser-cooled atomic clocks are also be ing de vel oped for flight aboard the International Space Station (eg. the NIST/NASA/JPL PARCS and the ESA/ACES projects) where they promise to deliver frequency accuracy of $\delta f/f=5\times10^{-17}$. Even more ex otic atomic clocks are be ing developed in laboratories with potential accuracies at the 10^{-18} level.

The underlying physical principles which govern all of these clocks will be il lus trated. The ba sic struc ture of many of these atomic os cil la tors will be pre sented along with some dis cus sion of the trade-offs in her ent in all of these de signs.

In par tic u lar, the la ser-cooled pri mary fre quency stan dards such as NIST-F1 and PTB CS-F1 will be the subject of detailed ex am i na tion. An ex am i na tion of this type of fre quency stan dard will re quire a short dis cus sion of la ser-cool ing. The la ser-cool ing pro cess used in NIST-F1 al lows the tem per a ture of the ce sium (cae sium) at oms used in the clock to be low ered from room temperature (300K) to 1 µK: a re duc tion of the ther mal en ergy of al most 9 or ders of mag ni tude! These very low en ergy ce sium at oms ob tained through la ser-cool ing are crucial to the operation of a frequency standard with an ac cu racy equal to or better than the 10^{-15} level. The rel a tively de tailed de scrip tion of NIST-F1, along with the pre vi ous pre sen ta tion of the more tra di tional atomic clocks, will al low a dis cus sion of the PARCS and ACES atomic clocks sched uled to be flown aboard the ISS in 2005.

Fi nally, the cur rent state of the art of new stan dards based on optical transitions will be pre sented. These op ti cal standards based on transitions with fre quen cies on the or der of 10^{15} Hz as op posed to the 10^{10} Hz hyperfine tran si tion frequen cies typ i cal of ex ist ing atomic clocks, are be ing ac tively de vel oped in many stan dards lab o ra to ries around the world. They are quickly approaching the ac cu racy of the very best hyperfine tran si tion atomic clocks and the fu ture prom ise of the op ti cal clocks is bright.

Steve Jefferts, a na tive of Se at tle, WA, re ceived his BS. in Phys ics from the Uni ver sity of Wash ing ton and his PhD in Atomic Physics/Precision Metrology from JILA/University of Col o rado in 1992. He then moved to NIST as an NRC post-doc toral fel low in the Time and Fre quency di vi sion work ing on trapped ions for quan tum com pu ta tion de vices. In 1994 he joined the Time and Fre quency di vi sion as a staff sci en tist where he has worked on pri mary fre quency stan dards and time transfer. Dr Jefferts' group de signed and op er ates NIST-F1 (the U.S. Pri mary Fre quency Stan dard) and is cur rently design ing the next gen er a tion of ter res trial la ser-cooled pri mary fre quency stan dards for NIST. Dr Jefferts is also a mem ber of the PARCS (Pri mary Ref er ence Clock in Space) ce sium clock pro ject to be flown aboard the In ter na tional Space Sta tion in 2005. PARCS is a joint NIST, Uni ver sity of Col o rado, Jet Propul sion Labs and NASA pro ject.

Please con tact Steve Jefferts to sched ule a visit to your area dur ing the pe riod from July 2003 – De cem ber 2004.

2004 – 2005 Dis tin guished Lec turer

Dr. Nava Set ter
CeramicsLaboratory
MaterialsInstitute
EPFL Swiss Fed eral In sti tute of Tech nol ogy
Lausanne, 1015 Swit zer land
nava.setter@epfl.ch

Down Scal ing in Piezoelectrics and Pyroelectrics:

Microdevices, Nanofabrication, Nanoscale Fea tures and Size Ef fects

Piezo- and pyroelectrics ma te ri als in the form of thin and thick films are finding new applications in various fast growing fields such as mo bile com mu ni ca tions and MEMS. The number of ap pli ca tions that could ben e fit from avail abil ity and im ple men ta tion of these films is likely to grow.

Size reduction of ferroelectric-based micro-components, both in thick ness and lat eral di men sions, is re quired for fu ture ap pli ca tions. This can be achieved by a reductive ap proach of etch ing of the sintered con tin u ous lay ers, or by an ad di tive approach in which a treat ment of the sub strate re sults in the cre-

ation of pat terned struc tures prior to the an neal ing step. Novel lo cal tech niques, e.g., pi ezo elec tric force mi cros copy, al low the anal y sis of prop er ties in such small com po nents.

Var i ous microdevices will be de scribed, is sues in fab ri cation tech nol ogy will be dis cussed, and data and in ter pre ta tion of lo cal mea sure ments will be re viewed. In light of these results, size effects in ferroelectrics and their significance in emerg ing ap pli ca tions will be dis cussed.

Nava Set ter re ceived B.Sc. and M.Sc. de grees in Civil En gineer ing from the Techion – Isreal In sti tute of Tech nol ogy and Ph.D. de gree in Solid State Sci ence from the Penn syl va nia State Uni ver sity in 1980. She has worked in the area of ferro elec tric ceram ics and sin gle crys tals, mi cro wave di elec tric and fer rites at the Pennsylvania State University, USA, at the University of Geneva, Swit zer land, and R&D lab o ra to ries, Isreal. Since 1989 she is head ing the Ce ram ics Lab o ra tory of the Swiss Fed eral In sti tute of Tech nol ogy at Lausanne (EPFL), a pro fes sor in Ma te rials Science and Engineering, and an affiliated professor in Microtechnology En gi neer ing at the EPFL. She was nom i nated a mem ber of the Swiss Acad emy of Tech ni cal Sci ences in 1995. Her sci en tific in ter ests are in pi ezo elec tric and re lated bulk ceram ics/crys tals and ce ramic thin and thick films for sen sors, ac tua tors, and ca pac i tors. She has authored and co-authored over 200 sci en tific pa pers in this area. She was the Gen eral Chair for the 1998 ISAF meet ing in Montreux.

Please con tact Nava Set ter to sched ule a visit to your area dur ing the pe riod from July 2004 – De cem ber 2005.

Nom i na tions for Dis tin guished Lec turer Award

Nom i na tions may be sub mit ted at any time. Any mem ber may sub mit a nom i na tion by send ing the nom i nee's name and a descrip tion of that per son's main con tri bu tions, along with the submitter's own name and ad dress. Mem bers are also en couraged to sug gest top ics which they feel would be of in ter est. Send nom i na tions and top ics to:

Bernhard R. Tittmann – Awards Vice-Chair
Chair, UFFC-S Dis tin guished Lec turer Sub com mit tee
Schell Pro fes sor
En gi neer ing Sci ence & En gi neer ing
212 Earth & En gi neer ing Sci ence Bldg.
The Penn syl va nia State Uni ver sity
Uni ver sity Park PA 16802 USA
brt4@psu.edu
Bernhard.tittmann@ieee.org

UFFC Outstanding Paper Award

The Out stand ing Pa per Award is pre sented to the author(s) of a paper published in the IEEE UFFC-S Trans ac tions which ex em pli fies ex cellent tech ni cal con tri bu tions and is clearly written. The winner is selected on the basis of: orig i nal ity, in ter est to the mem ber ship, con tri butions to the field, clar ity of writ ing, and time li ness. Selection is made by the Awards Committee. Nominations and comments from the Ed i tor-in-Chief, As so ci ate Ed i tors and Guest Ed i tors of the Trans ac tions are so lic ited.

Pa pers are re viewed as a group for each Volume of the UFFC-S Transactions (January through De cem ber). In a given year, usu ally one paper is selected, but the Awards Committee may chose to give no award or mul ti ple awards when circumstances warrant. Presentation is usu ally at one of the So ci ety's ma jor sym po sia. The award con sists of a plaque and a cer tif i cate. The Out stand ing Pa per Award was first pre sented in 1956.

Out stand ing Pa per Award re cip i ents (l-r) Jouni V. Knuuttila, Jul ius Koskela, Tapani Makkonen, Vic tor P. Plessky, Martti M. Salomaa

2001 Out stand ing Pa per Award Re cip i ents

The UFFC So ci ety is proud to an nounce the win ners: **Julius Koskela, Jouni V. Knuuttila, Tapani Makkonen, Vic tor P. Plessky, Martti M. Salomaa**. The work was per formed for Nokia Re search Cen ter, Fin land. They are all au thors of the selected paper on **"Acoustic Loss Mechanisms in Leaky SAW Res o na tors on Lith ium Tantalate",** Trans ac tions on UFFC, Vol. 48, No 6, pp. 1517 – 1526.

The pre sen ta tion for the 2001 Out stand ing Pa per Award contained in volume 48 of the UFFC Transactions was made by Prof. Reinhard Lerch, chairman of the UFFC


Jouni V. Knuuttila


Jul ius Koskela


Tapani Makkonen


Vic tor P. Plessky


Martti M. Salomaa

Awards committee, during the opening ceremony of the IEEE Ultrasonics Sym po sium in Mu nich. The mem bers of the Award Com mit tee se lected this pa per among all oth ers ap pear ing in vol ume 48 of the IEEE UFFC Trans ac tions, be cause this pa per is mas ter fully writ ten with con cise ex-pla na tions and smooth tran si tions. In spite of the fact the field of sur face acous tic wave de vices is highly de vel oped, the au thors were able to cre ate ex cite ment in the "search for the per fect fil ter."

Reinhard Lerch
Chair UFFC AwardsUFFC Fel lows

UFFC Fellows

Brief History of IEEE Fellow Program

The grade of Fel low first ap peared in the AIEE con sti tu tion of 1912. In that year, the AIEE re vised its mem ber ship struc ture and established the grade of Fellow for those engineers who had dem on strated out stand ing pro fi ciency and had achieved dis tinc-tion in their profession. Potential Fellows had to be at least thirty-two years of age, with a min i mum of ten years ex pe ri ence. When the IRE es tab lished its Fel low grade in 1914, the re quire-ments were clearly mod eled on those of the AIEE. Much of the word ing in the rel e vant sec tions of the IRE con sti tu tion is iden ti-cal to the cor re spond ing word ing in the AIEE con sti tu tion.

For the first sev eral years af ter the es tab lish ment of the Fel-low grade, both the AIEE and the IRE allowed Members to make di rect ap pli ca tion for trans fer to Fel low. In both cases, ap-pli ca tions had to be ac com pa nied by ref er ences from five ex ist-ing Fellows, and required the approval of the Board of Di rec tors. In 1939, the IRE mod i fied its pro ce dure to make ad-mis sion or trans fer to the Fel low grade pos si ble only by di rect in vi ta tion of the Board of Di rec tors, a pol icy it main tained un til the merger in 1963. In 1938, the AIEE mod i fied its con sti tu tion to pro vide that 'Ap pli ca tions to the grade of Fel low shall re sult only from a pro posal of five Mem bers or Fel lows.' In 1951, the AIEE pro hib ited ap pli ca tions for Fel low grade al to gether, and adopted a pol icy of di rect in vi ta tion sim i lar to that of the IRE.

As noted above, nu mer ous elec tri cal en gi neers were mem-bers of both the AIEE and the IRE, and many of these be came Fellows of both organizations. When the two institutes merged in 1963, all AIEE and IRE Fel lows au to mat i cally be-came Fel lows of the IEEE. In 1942, the IRE had be gun to is sue ci ta tions to new Fel lows, briefly de scrib ing their ac com plish-ments. The AIEE followed suit in 1952, and the IEEE con tin ued the prac tice af ter the merger.

Since 1963, the IEEE Grade of Fel low has been con-ferred by the Board of Di rec tors upon a per son with an ex-traor di nary re cord of ac com plish ments in any of the IEEE fields of in ter est. A brief ci ta tion is is sued to new Fel lows de scrib ing their ac com plish ments and the to tal num ber se-lected in any one year does not ex ceed one-tenth per cent of the to tal vot ing In sti tute mem ber ship.

UFFC Fel lows

The UFFC So ci ety has en joyed an un usu ally high num ber of mem bers who have be come IEEE Fel lows thanks to the UFFC Fellow Com mit tee un der the lead er ship of Rich ard M. White, University of California, Berkeley. For a complete listing of UFFC fel lows see http://www.ieee-uffc.org/about/fel lows.html.

2002 IEEE Fel low Award for Prof. Noriyoshi Chubachi

One of the 2002 UFFC So ci ety fel low awards was pre sented at the Munich Ultrasonics Symposium. Professor Noriyoshi Chubachi from Sendai Uni ver sity was awarded for his long-term ex cel lence in ul tra sound re search. His fel low cer tif i cate reads:

"For con tri bu tions to the field of pi ezo elec tric ma te ri-als, ultrasonic microscopy, materials characterization, and med i cal ultrasonics."

Dr. and Mrs. Noriyoshi Chubachi with Elke and Reinhard Lerch.

Prof. Noriyoshi Chubachi re ceiv ing IEEE Fel low award from Ahmad Sa fari.

This fel low award was pre sented at the eve ning ban quet of the Munich Symposium, which was held at the Hofbräukeller. The Hofbräukeller as one of Munichs old-est and most famous traditional brewery restaurants hosted the at ten dees of the Sym po sium by serv ing Ba var-ian food and beer ac com pa nied by a tra di tional dance and sing show. The fel low award was pre sented right be fore the start of the show by Ahmad Safari, President of the UFFC So ci ety and Reinhard Lerch, Chair man of the UFFC Awards Com mit tee.

2003 UFFC Fel lows

Con grat u la tions to the newly elected UFFC IEEE Fel lows:

Dr. John Au gust Kosinski, 2003, *"for con tri bu tions to pi-ezo elec tric sub strate ma ter i als and res o na tors."*

Mr. William Jefferson Riley, Jr., 2003, *"for con tri bu-tions to high per for mance ru bid ium gas cell fre quency stan-dards and sta bil ity anal y sis*

Dr. Masanori Koshiba, 2003, *"for con tri bu tions to the mod el ing of op ti cal wave prop a ga tion in pho ton ics de vices.*

Prof. Satish S. Udpa, *"for con tri bu tions to the de vel op-ment of meth ods for solv ing in verse prob lems in the field of non de struc tive eval u a tion."*

Pre sen ta tion of these awards will take place at var i ous sym po-sia in 2003.

Fellow Nominations

Now is the time to be gin think ing about nom i nees for 2004 elec tion. Nom i na tions are due in early spring. Nom i na tion kits for IEEE Fellow may be obtained at http://www.ieee.org/about/awards/fellows/request.htm.

STANDARDS

Standards Activities Report

Art Ballato

The IEEE UFFC Standards Committee is looking for proactive volunteers to pop u late a num ber of its sub com mit tees. Sub com mit tees are re spon si ble for for-mu lat ing stan dards in the var i ous tech ni-cal ar eas of in ter est to the UFFC So ci ety. If you wish to vol un teer, please con tact Art Ballatoa.ballato@IEEE.org.

The fol low ing is a sta tus re port on the UFFC stan dards ac-tiv i ties pre sented to the UFFC AdCom 8 Oc to ber 2002:

1. Our society is currently responsible for ten items, eight stan dards, one pro ject, and one "start-up."
2. **Ferro elec trics - A. H. Meitzler** (180-1986)
   Preparation of a standard to replace ANSI/IEEE Std 180-1986, "IEEE Stan dard Def i ni tions of Pri mary Ferro-elec tric Terms" is now in its 14th draft ver sion. This is en ti-tled "IEEE Stan dard Defintions of Terms As so ci ated with Ferro elec tric and Re lated ma te ri als," and is posted at:

http:www.mrl.psu.edu/faculty/stm/IEEEStandard.pdf. The sub com mit tee con tin ues to in vite com ments and sug-ges tions from in ter ested read ers; these should be sent to: <STMcKinstry@psu.edu>.

3. **Losses in Electromechanical Materials - S. Sherrit**
   Work has been pro gress ing on the full first draft of the pro-posed stan dard "Stan dards on Char ac ter iza tion of Losses in Electromechanical Materials." Writing assignments include:
   - Over view of non-lin ear ef fects; Sherrit
   - Var i ous as pects of com plex cou pling; Sherrit/Pappalardo/Lamberti
   - Ray leigh's Law and intrisic/ex trin sic con tri bu tions to pi ezo elec tric ef fect; Damjanovic
   - Mea sure ment Er rors/Con di tions; Cain
   - Fou rier meth ods ap plied to elec tro me chani cal ma teri als; Leary

   The com mit tee is pre par ing the stan dard us ing the internet and will meet next in 2003 at one of the IEEE-UFFC-spon-sored sym po sia.
4. **Time and Fre quency - E. Ferrè-Pikal** (1139-1988 and 1193-1994; J. R. Vig SCC-27 li ai son)
   No report. [The SCC27 has been working on updating IEEE std 1193 "Guide for Mea sure ment of Environmenta Sensitivities of Standard Frequency Generators." It is planned to bal lot the draft and sub mit to the IEEE Stan-dards Board for ap proval.]
5. **Surface Acoustic Wave Devices - P. Dufilie** (1037-1992)
   [A committee website is now operational at http://pages.cthome.net/saw.stan dards/.]
6. **Piezoelectric Crystals – W. P. Hanson** (176-1987 and 177-1966)
   No re port. [Re vi sion of Piezoelectricity Stan dard 176: A list of cor rec tions is be ing pre pared.]
7. **Sensors, Actuators, & Transducers - R. M. Lec and S. J. Mar tin** (P1182)
   No re port. [A website for post ing drafts for pro ject 1182: "IEEE Guide to Terms and Def i ni tions of Ferro elec tric, Frequency Control, and Ultrasonic Sensors" is being constructed.]
8. **Piezomagnetic Tech nol ogy - S. L. Ehrlich** (319-1990)
   Currently inactive. [It is planned to post corrections to 319-1990 on the UFFC website.]
9. **Ultrasonics in Med i cine** - (790-1989)
   Currently inactive. [REVCOM administratively withdrew Stan dard 790-1989 (R1996) "Guide for Med i cal Ul tra sound Field Pa ram e ter Mea sure ments" in De cem ber 2001.]

AR THUR BALLATO
Chair, Stan dards Activi ties

Publications

Publications Committee

Don Yuhas, Vice-Chair of Publications.

Welcome to **Dr. Don Yuhas** who has accepted the position of Vice-Chair of the Publications Committee.

The Publications Committee is charged with es tab lish ing long-range publications policy in accordance with the plans of the So ci ety, mon i tor and an a lyze the cur rent pub li ca tions of the So ci ety, and to make ap pro pri-ate recommendations on quality, costs, and sched ules of the pub li ca-tions. The Publications Committee chaired by the Vice-President for Publications makes publication recommendations to the AdCom for dis cus sion and ap proval.

The mem bers of the Pub li ca tions Com mit tee in clude the Vice Chair, the Ed i tor-in-Chief and As so ci ate Ed i tor-in-Chief of the UFFC Trans ac tions, the Ed i tor of the News let ter, the Web Ed i-tor-in-Chief, the UFFC rep re sen ta tives to the IEEE Sen sors Jour-nal, Jour nal of Lightwave Tech nol ogy, Trans ac tions on Med i cal Imaging, Trans ac tions on Ap plied Su per con duc tiv ity, and the Ed i tors of the Pro ceed ings of the IEEE In ter na tional Ultrasonics Sym po sium, Pro ceed ings of the IEEE In ter national Sym po sium on the Applications of Ferroelectrics, and Proceedings of the IEEE In ter na tional Fre quency Con trol Sym po sium. The UFFC Fi nance Chair is also a mem ber of this com mit tee.

UFFC Trans ac tions

It has been about one year since the new ed i to rial team took of-fice. Dur ing this pe riod, with the help and sup port of all As so-ciate Editors, UFFC Society officers, especially our Vice-Pres i dent for Pub li ca tions, and FASS (Fed er a tion of An-imal Science Societies), the IEEE Transactions on Ultrasonics, Ferro elec trics, and Fre quency Con trol (TUFFC) has made a suc cess ful tran si tion of the of fice, and con tinue to pro vide qual ity ser vice to our mem bers and read ers.

Since June 1, 2002, TUFFC has adopted an elec tronic sub-mis sion and peer-re view sys tem - Manu script Cen tral (MC). This sys tem has made our manu script han dling and pro cess-ing much more ef fi cient. It has re duced the work load of AEs and the editorial of fice dra mat i cally, pro vid ing more timely and better ser vice at a lower cost to the So ci ety.

How ever, we still have manu scripts re main ing in the old (leg acy) pa per-based sys tem. The ed i to rial of fice is mak ing ev ery ef fort to pro cess these manu scripts rap idly.

Meet the IEEE UFFC Trans ac tions Ed i tor-in-Chief, Dr. Jian-yu Lu, and As so ci ate Ed i tor-in-Chief, Dr. Mar jo rie Passini Yuhas.

Dr. John Vig

The fol low ing are some sta tis tics of both the leg acy and the MC sys tems.

It has been eight months since we started pro cess ing new manu scripts via the on line Manu script Cen tral. Un for tu nately for the As so ci ate Ed i tors ac tive at that time, we still had 172 manu scripts still in the ac tive state of re view. We are pleased that as of the end of Jan u ary 2002 we have only 47 manu-scripts still in the ac tive state of re view. With strong co op er a-tion from the As so ci ate Ed i tors and the au thors, we are driv ing to have the legacy review system closed down by June of 2003. The chart be low in di cates the time from sub mis sion to ac cep tance. The av er age time per manu script is well over 200 days for all the manu scripts pro cessed since Jan u ary 2001.

Since the so ci ety started to use MC eight months ago, the sys tem has run smoothly. The fol low ing are pre lim i nary data il lus trat ing its op er a tion. As time goes on, we will be able to pro vide more ac cu rate sta tis tics.

To tal num ber of manu scripts in MC: **203**:

45 have been ac cepted for pub li ca tion
18 ejected
8 with drawn.

Time from Sub mis sion to De ci sion (any de ci sions):
Average **87.26** days
Time from Sub mis sion to Ac cep tance:
Average **114.32** days
Time from Sub mis sion to Re jec tion:
Average **78.83** days
Time for As so ci ate Ed i tor to in vite Re view ers:
Average **9.38** days

Cur rently, there are **668** po ten tial re view ers in MC. Among them, 278 have helped us to review the manuscripts. We would like to sin cerely thank them for their im por tant anon y-mous hard work that helps to maintain the high quality of TUFFC.

We would also like to thank all au thors for their con tri bu-tions to TUFFC.

Jian-yu Lu, Ed i tor-in-Chief
Marj Yuhas, As so ci ate Ed i tor-in-Chief

WEB Ed i tor-in-Chief

Dr. John Vig, our found ing Web Ed i tor-in-Chief, has passed the ba ton to Dr. Sorah Rhee ef fec tive Jan u ary 1, 2003. Un der John's lead er ship and guid ance UFFC has gone from hav ing little web presence to a site that enjoys over 1000 hits per month. The site con tains a com pre hen sive com pen dium of So-ci ety ac tiv ity and pub li ca tions. Each of the UFFC Tech ni cal Standing Committees (Ultrasonic, Ferroelectrics, and Fre-quency Con trol) has a web ed i tor who en sures the lat est news and in for ma tion is posted.

John will be missed, but I am sure we will con tinue to hear his voice. Wel come Sorah!

Please visit www.ieee-uffc.org.

Ultrasonics Web Com mit tee

The 2002 Web Com mit tee meet ing was held on Oc to ber 10, 2002 in Mu nich at the IEEE Ultrasonics Sym po sium. In at ten dance were Bill Walker, Martin Anderson, Levent Degertekin, Svetoslav Nikolov, Richard Chiao and guests Donna Hurley (NIST) and Don Chris to pher (Philips). (Sev eral mem bers were un able to at tend due to a sched ule con flict with the As so ci ate Ed i-tors meeting.) Although new contributions to the Ultrasonics web slowed dur ing the past 12 months, many sec tions re ported good works-in-prog ress, so we ex pect a new in fu sion of ma te rial over the next sev eral months. In par tic u lar, we ex pect the ma te ri-als da ta base to be launched by Bill's team and the Soft ware sec-tion to be further expanded by Martin. Levent and Svelsav re ported on plans for the Teach ing Re sources sec tion and Ex ter-nal Links, respectively. Finally, our hit-rate exceeded 1000 hits/month, which was our goal set in 2000.

I would like to take this opportunity to thank the Ultrasonics Web Com mit tee and John Vig whose ded i ca tion has cre ated this website to serve our pro fes sion.

Sincerely,
Rich ard Chiao
Web Ed i tor-for-Ultrasonics

HISTORY

This Day in History

7 March 1926

The first radio-telephone call across the At lan tic was made, be tween Lon don and New York.

9 March 1900

Howard Hathaway Aiken, a mathematician who in vented a fore run ner of the mod ern elec tronic dig i tal com puter known as the Har vard Mark I, was born on this day.

22 March 1960

Al most one year af ter Charles Townes pat ented the ma ser, he and Ar thur Schawlow pat ented the first la ser.

24 March 1959

Charles Townes pat ented the ma ser.

25 March 1954

RCA an nounced the pro duc tion of color tele vi sion sets.

27 March 1961

Remington Rand UNIVAC, a di vi sion of Sperry Rand, loaded the first mo bile com puter cen ter, a UNIVAC Solid-State 90 com puter, into a mo tor van.

3 April 1876

Thomas Ed i son ex e cuted his first pat ent ap pli ca tions from Menlo Park, on acoustic telegraphy. Link to: http://www.thomasedison.com/biog.htm

7 April 1959

Sci en tists in Stan ford, CA first bounced ra dar off the sun.

9 April 1770

Thomas Johann Seebeck, who dis cov ered in 1821 that an elec tric cur rent flows be tween dif fer ent con duc tive ma te ri als that that are kept at different temperatures, was born on this day. Link to: http://chem.ch.huji.ac.il/~eugeniik/history/seebeck.html

14 April 1943

John Grist Brainerd, di rec tor of re search at the Uni ver sity of Penn syl va nia's Moore School, sub mit ted to the U.S. Army's Ballistics Re search Lab o ra tory John Mauchly's pro posal to build, ENIAC, the world's first elec tronic com puter. Link to: http://www.ieee.org/organizations/history_center/legacies/brainerd.html

24 April 1981

IBM in tro duced its first per sonal com puter.

26 April 1961

Robert Noyce patented the integrated circuit. Link to: http://www.ieee.org/organizations/history_center/legacies/noyce.html

A spe cial thank you to of the IEEE His tory Cen ter for sup-ply ing these facts. Please visit the His tory Cen ter website at (www.ieee.org/organizations/history_center).

UFFC History Committee

Have an in ter est in his tory?

Fred Hickernell

A History Committee is being formed to bring to our UFFC So ci-ety members and the engineering and sci en tific com mu ni ties sig nif i-cant and interesting events of the so ci ety and its re lated tech nol o gies over the past 50 years. A state ment of the com mit tee's vi sion, mis sion, and re lated tasks has been drafted and is given following this para-graph. This is a global ven ture and we need mem bers from all coun-tries, regions, and society-related tech nol o gies. If you are in ter ested in be ing on the com mit tee and help-ing de velop his tor i cal per spec tives re lated to the UFFC So ci ety, contact Fred Hickernell at the following email address, f.hickernell@ieee.org.

His tory Com mit tee Scope

Vision: The IEEE Ultrasonics, Ferro elec trics, and Fre quency Con trol So ci ety dis sem i nates re lated tech no log i cal in for ma-tion through pub li ca tions, con fer ences, and its website. The His tory Com mit tee will bring the added di men sion of his tor i-cal per spec tive to the so ci ety re gard ing its ar eas of tech nol ogy. This historical perspective will foster among members an aware ness of their pro fes sional his tory and in crease pub lic un-der stand ing of the field.

Mission: To promote a better understanding of the IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society and its re lated tech nol o gies through the dis sem i na tion of his-tor i cal in formation in var i ous forms eas ily ac ces si ble to the sci en tific, en gi neer ing, and gen eral pub lic com mu ni ties.

To hon or sig nif i cant achieve ments in the his tory of the field.

To encourage the preservation of historically important ma te ri als and sites.

To col lect doc u ments, pho to graphs, and ob jects per tain ing to sig nif i cant his tor i cal events and de posit them in ap pro pri ate repositories.

Goals:

I. Pre serve and Con sol i date Ex ist ing So ci ety and Technology History.

Objective: Gather in a con ve nient and us able form for ac cess by so ci ety mem bers and in ter ested par ties, his tor i cal and tech-nol ogy doc u men ta tion al ready in print.

Strategies:

1. Develop a bibliography of historical articles already published in journals, conference proceedings, and newsletters.
2. Develop a similar bibliography representing key milestone contributions to specific areas of the society's scientific and technological interests.
3. Make available selected articles of interest in special publications and on the website. This will be done in cooperation with the editors of society publications and the webmaster

II. Promote New Historical Publications

Objective: To develop written histories from knowledgeable authors in areas of their long-term contributions or interest.

Strategies:

1. Ask previous authors of historical articles to update and extend their contributions for presentation and publication.
2. Ask long-term contributors to particular technologies or society activities to write historical articles or anecdotal short stories or personal reflections.
3. Develop a format for interviewing pioneers of particular technologies and past society activities and have interviews with them for subsequent publication. {Tape or video are possible tools)
4. Consider a long-term set of oral histories to document the life of the society and the fields it covers. Establish a committee to think about who should be interviewed. Consider the IEEE History Center as a possible repository for the interviews.

III. Develop a Global Perspective and Balance on Historical Articles

Objective: To assure that historical contributions come from various countries and cultures and that the contributions are historically accurate.

Strategies:

1. Have on the Historr Committee at least one representative from a country, region, or technical area
2. Have that representative review, verify, and validate contributions or send the contribution to a competent reviewer.
3. Place contributions on the web for review and comments by interested parties before possible publication.

IV. Actively Promote Sessions on Historical Papers at UFFC-Society Symposia

Objective: To raise the awareness of the scientific and engineering community to the significance of the society's contributions.

Strategies:

1. Use the three symposia of the society to have presentations in oral or poster form related to their particular technology and interests.
2. On special anniversaries of the society, people, technologies, papers, or other key discoveries, have special oral or poster presentations and/or a display booth.

V. Honor for Mile stone Events

Objective: To honor sites of historic significance to UFFC Society Technologies

Strategies:

1. Identify significant events in UFFC history for nomination to the IEEE History Center's Mile stones Program.
2. Develop commemorative plaques to be mounted at the site of a significant event in electrical history related to UFFC Society technologies.

Historical Bibliography and Anecdotes

The History Committee of the UFFC Society is developing a bibliography of historical articles on the society and its technology developments which have already appeared in the literature. Also we are soliciting short anecdotal stories and personal remembrances (serious, interesting, and funny) of people and places associated with our society and/or its technologies. We will collect these for later publication and website placement. If you have any please email them to f.hickernell@ieee.org. The bibliography information can be sent in the usual format of author, title, and journal/conference/newsletter information. The anecdotes in a story mode. Thanks.

History Committee Activities

The History Committee of the IEEE UFFC Society is looking for historical articles and information on the major technologies represented by our society, its members' contributions over the last half-century, and stories about the UFFC Society itself. We will be celebrating the fiftieth anniversary of the society in 2003 and 2004, particularly with the joint conference in Montreal in August 2004. There is a plan to have sessions of a historical nature in the Montreal 2004 Conference from the three different areas that the UFFC Society represents. Society members are encouraged to submit such papers and suggest potential speakers to the respective technical program committees. The History committee continues to collect information from the world wide membership in the following areas:

1. Bibliographical information on articles already published in world wide journals, conference proceedings, and newsletters representing the history of technology developments and the society itself.
2. Translations into English of historic papers that appeared in the journals of countries outside the English-speaking world.
3. Anecdotal stories and personal recollections of significant events (factual, invitational, informational, and humorous), which shaped the lives, and careers of our members. This could be just a paragraph or two of some memory you would like to tell about or a major article like the early recollections of the society by Allen Meitzler, the first in stallment, which appeared in the Fall 2002 Newsletter. We will hope to collect a large number of these for separate publication and/or posting on the website.

4. Promotion of historical ses sions and ple nary speak ers at UFFC-So ci ety spon sored con fer ences. Not only the Montreal Con fer ence but fu ture con fer ences as well.
5. A list ing of the most sig nif i cant mile stones in the his tory of the so ci et ies' tech nol ogy of the past cen tury in its ma jor areas of in ter est
6. In ter views with the pi o neers in our tech nol ogy field or in the IEEE UFFC Society. Interviews have already been pub lished in the Fall News let ter of 2001 and Spring 2002.
7. Pro mote the his tor i cal sig nif i cance of the tech nol ogy of the UFFC So ci ety in the wider en gi neer ing, sci en tific, and educational com mu ni ties.
8. Sup port the IEEE His tory Cen ter with ar ti cles and ar ti facts.

Please send such in for ma tion to Fred S. Hickernell, Email: f.hickernell@ieee.org or 5012 East Weldon, Phoe nix, Ar izona 85018-6141, Phone 602-840-1719

Fred S. Hickernell
Chair, His tory Com mit tee

PERSONAL RECOLLECTIONS OF THE EARLY HISTORY OF THE UFFC-S – Part 2

by
Allen H. Meitzler
IEEE Life Fel low

Al Meitzler

This is the sec ond of a three part series by Al Meitzler describing his recollections of the beginnings of the UFFC So ci ety. Part 1 ap peared in the Sep tem ber 2002 UFFC Newslet ter. We pick up with Chap ter 4.

4. Mem o ries of Early Ultrasonics Symposia

For the first few years af ter the for ma tion of the IRE-PGUE, the leaders of the AdCom felt strongly that it was im por tant, from the point of view of in creas ing the vi tal ity and mem ber ship of the Group, that the Group hold its own Sym posiums separate and independent of the IRE March Meeting and Wescon Convention. This ob jec tive was re al ized when the first National Ultrasonics Symposium was held on the campus of Stan ford Uni ver sity, CA, on Au gust 17 and 18, 1959. For me, it has al ways been one of the most mem o ra ble of all the Ultrasonics Sym po siums I have at tended. There were sev eral things that con trib uted to mak ing this a mem o ra ble meet ing for me. First, this was the oc ca sion of my first trip to the west coast and my first visit to San Fran cisco. Sec ond, it was at this meet ing that I re ported my work on the shear-mode, non-dispersive, strip de lay line, the de vice which I re gard as the first im por tant in ven tion of my pro fes sional ca reer. The Symposium General Chairman was Vincent Salmon of the Stan ford Re search In sti tute. Among the out stand ing at ten dees at the meet ing were War ren P. Ma son and Wal ter G. Cady. (Cady at the time of this meet ing was 85 years old.) In a conversation after the session in which I presented my paper, Cady com pli mented me on my pre sen ta tion, an act of kindness that pleased me greatly and that made a last ing im pression on my mem ory.

The ban quet for this Ultrasonics Sym po sium was an other memorable occasion. It was held at Ricky's Hyatt Cabanya Ho tel in Palo Alto. The fea tured af ter-din ner speaker was W. G. Cady who was a fa mous and im por tant man in the his tory of Ultrasonics. He was the in ven tor of the quartz-sta bi lized electronic os cil la tor, a past-Pres i dent of the IRE, and the au thor of the famous textbook, "Piezoelectricity". In his after-dinner speech that evening, Cady reviewed the history of piezoelectricity and its application to ultrasonics and frequency con trol. He then went on to re count the tale of how the pat ent at tor neys at AT&T man aged to cheat him out of the credit (and roy al ties) for the in ven tion of the quartz-sta bi lized os cil la tor. There was some irony in this be cause many of the peo ple in the au di ence were em ploy ees of AT&T Bell Telephone Laboratories.

This meet ing was the first and only time I saw W. G. Cady. He was a re ally fine old gen tle man whom I re mem ber very favor ably. Not only did he com pli ment me on my pre sen ta tion, but later he sent me a list of cor rec tions to his text book along with a per sonal note. While meet ing Wal ter Cady was an outstand ing mem o ra ble ex pe ri ence for me, oth ers at tend ing the sym po sium knew him well. For ex am ple, when John May was an un der grad u ate at Wes leyan Uni ver sity, he had Cady as a Pro fes sor in his phys ics classes.

The second Ultrasonics Symposium, according to the UFFC-S his to ri ans, was held No vem ber 28-30, 1962, at the School of Ap plied Sci ence and En gi neer ing, Co lum bia University, New York City. John E. May, Jr. was the Chair man, I was the Vice-Chair man, and Rob ert Thurston was the Chairman of the Tech ni cal Pro gram Com mit tee. Cu ri ously enough, I have only the vagu est of rec ol lec tions of this meet ing even though I served as the Vice-Chair man. Per haps the fact that I was Chair man of the PGUE AdCom at this time kept the symposium from mak ing much of an im pres sion on me.

On the other hand, I re mem ber a lot of things about the 1963 Ultrasonics Symposium. I was the Chairman for this symposium, Robert Thurston was the Vice-Chairman, and Thrygve (Trig) Meeker was the Chairman of the Technical Program Committee. Perhaps the reasons I remember this meet ing so well were, first, be cause of the ex cite ment of be ing the Gen eral Chair man and, sec ond, be cause of the ex cite ment

Fig. 8. Fred S Hickernell (on the left) and the au thor. The pho-to graph was taken Sep tem ber, 2001, in Ann Ar bor, MI.. Fred was the Pres i dent of the UFFC-S dur ing 2001.

of run ning a sym po sium in a glam or ous place like Wash ing ton D.C. I do re mem ber that one of the perks of be ing the Gen eral Chair man was to have a nice, com pli men tary suite of rooms in the con fer ence ho tel. (The con fer ence ho tel was the Marriott Mo tor Ho tel also known as the "Twin Bridges Ho tel", if I re-mem ber cor rectly.)

Two ar eas as so ci ated with the 1963 Ultrasonics Sym po-sium that I can still pic ture in my mind are, first, the suite of rooms I en joyed, and sec ond, the area where the reg is tra tion desk was lo cated. I think the rea son I re mem ber the reg is tra-tion area so well was be cause of all the time I spent there try ing to re solve the has sles that go along with peo ple reg is ter ing for meetings. There was the con fu sion of who reg is tered in ad-vance and who didn't, what kind of pay ment to ac cept, the classes of reg is trants (mem ber, non-mem ber, stu dent), and the amounts they were asked to pay. Even though in those days the reg is tra tion fees were less than $50, there were still peo ple who com plained bit terly about the size of the reg is tra tion fee. I was glad when the third day of the sym po sium came and the rate of new reg is tra tions per hour fell off to zero. With the ad-ministrative responsibilities that went along with being the Sym po sium Gen eral Chair man, I did not get to spend much time in the tech ni cal ses sions lis ten ing to the pre sen ta tions.

An other per son who does have strong, vivid mem o ries of the 1963 Ultrasonics Sym po sium is Fred S. Hickernell. The 1963 Ultrasonics Sym po sium was the first IEEE meet ing that Fred ever at tended. Be fore that, as a young en gi neer he had at-tended other meet ings like APS meet ings. One of the things that he says he re mem bers made a very fa vor able im pres sion on him was that this meet ing was the first meet ing he ever at-tended where the Symposium Chairman and the Technical Pro gram Chair man were in the lobby, at the reg is tra tion desk, greet ing the peo ple who came to at tend the meet ing. (Fred, of course, later joined the IEEE and the UFFC-S and for many years served on the UFFC AdCom. In 2001, Fred served as Pres i dent of the UFFC-S.)

Per haps an other thing that con trib uted to the mem o ra bil ity of this meet ing is that it took place shortly af ter the as sas si na-tion and burial of Pres i dent John F. Ken nedy. One late af ter-noon during the meeting, John Rowen, who was then a Department Head at Bell Telephone Laboratories and my boss, or ga nized an in for mal group of peo ple to walk over the bridge to the Arlington Na tional Cem e tery where Pres i dent Ken nedy was bur ied and pay their re spects at Pres i dent Ken-nedy's grave. Hav ing a num ber of im por tant things to do and being of a conservative Republican political persuasion, I chose not to go along.

The following year, 1964, the Ultrasonics Symposium took place in Santa Monica, CA. This is an other meet ing that made a big im pres sion on me. For this meet ing, Rob ert L. Rod was the Sym po sium Gen eral Chair man and I was the Tech ni-cal Program Chairman. Robert L. Rod was the founder of Acoustica As so ci ates, an in dus trial ultrasonics firm lo cated on Long Is land. Sev eral years be fore 1964, Rod had sold his in-ter est in Acoustica As so ci ates and moved to the Santa Monica area, hence the reason he was interested in promoting an Ultrasonics sym po sium in the area and serv ing as its Gen eral Chairman. John Rowen, although not at the time on the IEEE-GSU AdCom, was Head of the Ul tra sonic De vice De-partment and an important, behind-the-scenes influence on the decisions that were made by the BTL members of the AdCom. Rowen was wor ried whether or not Rod was a good choice as General Chairman. Rod was more of a dynamic busi ness man, a wheeler-dealer type, rather than a con ser va-tive engineer. Rowen was concerned about whether or not Rod was go ing to be re spon si ble enough to carry out the du ties of the sym po sium Gen eral Chair man. For tu nately for the rep-u ta tion of the Ultrasonics Sym po sium and the IEEE-GSU, the meet ing went off very well and was quite suc cess ful.

Again, some of the things that con trib uted to the mem o ra-bil ity of this meet ing were; first, it was a west-coast meet ing; and sec ond, it was lo cated at a glam or ous site with a beau ti ful beach, palm trees, and a pic tur esque view of the Pa cific ocean. Most important of all, it was at this meet ing at which I met Cecil E. land. Af ter one of the ses sions, Cecil came up to me and in tro duced him self to me. He told me he was em ployed by the Sandia Cor po ra tion in Al bu quer que, NM, and was work-ing on piezoceramic trans ducer ma te ri als. He said that he had en joyed read ing sev eral of my pa pers and wanted to meet me. We be came im me di ate friends and this friend ship be came one of the deep est and most in flu en tial friend ships of my pro fes-sional career. Cecil Land and I were both active on the IEEE-GSU Ferro elec trics Com mit tee from its in cep tion and later he be came the Chair man of the Ferro elec trics Com mit tee serv ing in that ca pac ity from 1978 to 1990[1]

There is one other in ter est ing his tor i cal item that hap pened at the 1964 Ultrasonics sym po sium. The last few de cades have seen a tre men dous growth in the area of SAW (sur face acous-

[1] Cecil Land died in Jan u ary 1998 and the UFFC-S hon ored him by ded i cat ing the July 2000 is sue of the *IEEE Trans ac tions on UFFC* to him. Ahmad Sa fari and I shared the honor of serv ing as the guest ed i tors for this spe cial is sue.

[2] The pa per by Rowen was listed in the sup ple men tary pro gram as "J6 High Fre quency Dispersive Ul tra sonic De lay Lines". In the text of the ab stract the words "sur face wave grat ing de lay line" are used.

tic wave) de vices. John Rowen gave the first pa per on a surface ar ray trans ducer struc ture to pro duce sur face waves on crys tal line quartz at this meet ing. The pa per was in cluded into the pro gram as a post-dead line pa per and, as such, was not included in the printed ad vance pro gram for the meet ing; but the ti tle and ab stract were pub lished in the Fi nal Pro gram sup plement for the 1964 Symposium on Sonics and Ultrasonics. (The text of the ab stract is in the Dig i tal Ar chive of the UFFC and can be found by sim ply typ ing J. H. Rowen into the search engine. Un for tu nately, there never was a fol low-up pa per published by Rowen in a tech ni cal jour nal, but there was a pat ent ap pli ca tion filed and a U.S. pat ent is sued[3])

The following year, 1965, the Ultrasonics Syumposium moved back to the east coast. The site of the sym po sium was Boston, MA. For me, the 1965 Ultrasonics Sym po sium was mem o ra ble, not so much for the events that took place dur ing the sym po sium, al though I am sure there must have been a num ber of fine pa pers pre sented, but rather for things that happened be fore and af ter the Sym po sium. Da vid L. Arenberg was the General Chairman for this symposium. Dave Arenberg and John May had worked to gether in a Navy Research lab o ra tory dur ing the later days of World War II and were old friends. It was this association that launched John May on his ca reer in ul tra sonic de lay lines. In any event, sometime a few months be fore the meet ing, John May ar ranged for the two of us to visit Dave and check out the ar range ments for the Ultrasonics Sym po sium. As part of the visit, Dave gave us a guided tour of Boston and MIT. Dave had a mem ber ship in the sail ing club at MIT, so it was pos si ble for him to ar range to rent a sail boat and take John and me for a sail on the Charles River. The ride in the small, open sail boat and the roast beef dinner at the fa mous Durgin Park res tau rant are two of my fond mem o ries of the Boston meet ing.

In con trast to my fond mem o ries, there was a no ta ble event as so ci ated with the Boston meet ing that left hor ri ble mem ories for sev eral at ten dees. The 1965 Ultrasonics Sym po sium was a three-day meet ing, cov er ing Wednes day, Thurs day, and Fri day. Many of the at ten dees, my self in cluded, lived on the East Coast and so it was pos si ble, if you wanted to get home Friday evening, to catch an evening airplane flight from Boston. In those days, East ern Air lines was still in ex is tence and fly ing the "East ern Air lines Shut tle". The shut tle had the nice fea ture that no ad vance ticket was needed. You showed up at the gate, bought a ticket, and boarded the next flight out, which is just what I did. I ar rived home Fri day eve ning with out any dif fi cul ties.

The fol low ing Sat ur day morn ing started out like any other week end Sat ur day in the Fall. Some time dur ing the morn ing, I re ceived a tele phone call from Stan ley Jacke. Stan lived in the New England area and worked at Branson Ultrasonics. We were good friends from our as so ci a tions in IEEE ac tiv i ties and meet ings. He re ported that an East ern Air line's shut tle, fly ing from Boston to New ark, had a mid-air col li sion and had gone down in a farmer's field some where in New Jer sey. He was call ing to find out if I was on the plane and was pleased to hear that I was not. A lit tle while later, af ter I fin ished talk ing to Stan, I got an other call from Friedolph Smits. Friedolph had become the head of the Ultrasonic Device Department at Murray Hill, in which I was in cluded. He was call ing to see if I was OK and if I had any in for ma tion on who in our de part ment might have been fly ing on the air plane that crashed. I told him that I did not know of any one in our de part ment who had plans to fly back from Boston on Sat ur day morn ing.

As I found out later, there were peo ple on the plane who were re turn ing from the Boston Ultrasonics Sym po sium. At the time of this writ ing, the two peo ple whose names I know for sure are War ren Ma son and Eric Hafner. Both men sustained in ju ries that re quired them to spend some pe riod of time in the hos pi tal for re cov ery. War ren Ma son seemed to get over the ac ci dent very well, and re sumed trav el ing to meet ings in a short time, as if noth ing had hap pened. For Eric Hafner, it was a more traumatic experience. On several occasions, years later, I tried to en gage him in con ver sa tions about the ac ci dent. On one of these oc ca sions, he told me that, af ter the ac ci dent, it took him two years be fore he was able to book an air plane flight and travel by air. On those sev eral oc ca sions when I talked to Eric about the ac ci dent, I would say, "Eric, why don't you write up your rec ol lec tions of that flight for pub li ca tion in the UFFC-S News let ter. It would make in ter est ing read ing for a lot of the UFFC-S mem bers." Eric's re ply, was al ways the same, "I don't want to talk about it or write about it; I don't even want to think about it."

There is one other sad as so ci a tion that I have with the 1965 Ultrasonics Sym po sium in Boston. Dave Arenberg, who was the Gen eral Chair man, lived in Roch es ter, Mas sa chu setts. A finer, more pleas ant in di vid ual would be hard to imag ine. He was murdered in his home six years later, on Sep tem ber 7, 1971[4].

There where other mem o ra ble meet ings in the late 1960s and early 1970s in clud ing meet ings in Cleve land, New York City, St. Louis, Mi ami, and Van cou ver, B.C. I will leave it to oth ers to bring these meet ing to life with their rec ol lec tions.

5. Mem o ries of Early Fre quency Con trol Sym po siums

I joined Bell Telephone Lab o ra to ries in the Fall of 1955. I think the first Fre quency Con trol sym po sium I at tended was in 1957. In those days, the sym po siums were un der the spon sorship and con trol of the U.S. Army Sig nal Corps head quar tered in Ft. Monmouth, New Jer sey. Ft. Monmouth is close to re sort com mu ni ties along the NJ shore. In the late 1950s and early 1960s the Fre quency Con trol Sym po siums were held in places like Asbury Park and At lan tic City. The meet ings were held in lux u ri ous and, at one time, grand ho tels on the ocean front. In Asbury Park, the ho tel was the Berke ley-Cartaret Ho tel, in At lan tic City it was the Shelburne Ho tel.

[3] Pat ent No. 3,289,114, "Tapped Ul tra sonic De lay Line and Uses There for", filed Nov. 29, 1966.

[4] His obit u ary was pub lished in the Jan u ary 1972 is sue of the *IEEE Trans ac tions on Sonics and Ultrasonics*, Along with many de tails of his ac com plish ments dur ing a long and pro duc tive ca reer, the obit u ary re ported the fol low ing: "He was liv ing in the fam ily's home at the mo ment of his un timely death. He was found brutally beaten at the hands of an un known as sail ant. The world loses im mea sur ably in his pass i ng. The loss of a kind, ded i cated, gen tle friend is made all the greater by the sense less ness of the man ner of his pass ing."

The first Fre quency Con trol Sym po sium I at tended was in 1957 at the Berke ley-Cartaret Ho tel in Asbury Park. I managed to get ap proval to at tend two days of the 1957 Sym posium. My wife liked very much to spend time on the beach at the NJ shore, so she de cided to go along with me and ar ranged for a rel a tive to care for our first son, who was then only two years old. Since we had de cided rather late to at tend the sympo sium, we wound up stay ing in a mo tel near the con fer ence ho tel, rather than in the con fer ence ho tel it self.

One of the main rea sons I wanted to at tend the meet ing was to have a chance to meet Prof. Ray mond D. Mindlin. Pro fes sor Mindlin was the leader of the dom i nant re search ac tiv ity, located at Co lum bia Uni ver sity in New York City, in the anal ysis of vi bra tions in bounded sol ids. He had for many years a con tin u ing re search con tract with the Army Sig nal Corps concerned with the analysis of the vibrations of quartz plates. Prof. Mindlin was al ways the fea tured speaker at Fre quency Con trol Sym po siums, usu ally be ing the first pre senter of a paper on the pro gram. I at tended the open ing ses sion and heard the pa per that Prof. Mindlin pre sented.

Dur ing the lunch break be tween the morn ing and af ter noon ses sion, I hap pened to see Prof. Mindlin at the cof fee shop lunch coun ter by him self. "Aha", I said to my self, "Here is my chance to meet him." For tu nately, there was an empty seat beside him, so I went up to the coun ter, sat in the empty seat, and in tro duced my self to him as Allen Meitzler, some one who recently joined Bell Tele phone lab o ra to ries in Roger Sykes' Depart ment. Af ter the pre lim i nary in tro duc tion, I be gan to ask him some tech ni cal ques tions about the modes of prop a ga tion pre dicted by the Ray leigh-Lamb equa tion for stress waves in a plate, since at the time I was par tic u larly in ter ested in the subject and I knew Prof. Mindlind had done some pioneering work in mapping out the general nature of these modes of prop a ga tion. I was in the mid dle of ex plain ing some thing to him that was both er ing me, when sud denly he stopped me and said, " Who are you? Where do you come from? You talk just like one of my stu dents!" I was mo men tarily taken aback by this abrupt ques tion, but I re cov ered and then ex plained to him that I did my grad u ate work at Lehigh Uni ver sity on an ex per i men tal study of tran sient stress wave prop a ga tion at the impacted end of a cy lin dri cal bar and that my the sis pro fes sor was Prof. Cassius Curtis. Af ter the mys tery of my or i gins was cleared up, we con tin ued on with the dis cus sion and had a pleas ant, brief con ver sa tion un til it was time for him to leave. And that was my in tro duc tion to Prof. Mindlin. Of course, neither one of us knew at that time, that one of his grad u ate students, Harry Tiersten, would within a few years join Bell Tele phone Lab o ra to ries in the Ul tra sonic De vice De part ment headed by John Rowen in which I would be work ing.

Meet ing Prof. Mindlin was the most mem o ra ble event of the first Fre quency Con trol Sym po sium that I at tended. There was one other thing that im pressed me about that first Frequency Con trol Sym po sium. Lo cated on the top floor of the con fer ence ho tel was a hos pi tal ity suite. If I re call cor rectly, it was ac tu ally lo cated in a large ball room with a view over looking the ocean. There was an open bar and a large ta ble loaded down with all sorts of good food. The hos pi tal ity room was of course spon sored by ven dors who were in ter ested in sell ing equip ment to the en gi neers and man age ment peo ple at tend ing the meet ing. There were a num ber of ta bles and chairs spread around the room, so that you could get a drink at the bar, load up a plate with food at the main ta ble, and then find a smaller ta ble at which to sit down with friends and dis cuss what ever sub jects came to mind. The hos pi tal ity room made a big impres sion on me be cause it was the first time I had ever ex pe ri enced any thing like it at a tech ni cal con fer ence. Up un til then, I had at tended meet ings like the Amer i can Phys i cal So ci ety meet ings or Acous ti cal So ci ety meet ings or the IRE meet ings such as the In ter na tional Con ven tions in New York City or the Ultrasonics Symposiums. These meetings, by comparison, were rather aus tere.

Be tween 1957 and 1965, I prob a bly at tended sev eral of the Fre quency Con trol Sym po siums since they were close by my work lo ca tions in Whippany and Murray Hill NJ. The next Fre quency Con trol Sym po sium from which I still have specific rec ol lec tions was the 1965 Fre quency Con trol Sym posium held at the Shelburne Ho tel in At lan tic City. What made this one memorable was a combination of circumstances. About a month be fore the Sym po sium, I bought a new 1965 Bu ick "Sportwagon" an in ter me di ate size station wagon. I was able to ar range for my self and three mem bers of my su per visory group at Murray Hill to at tend the sym po sium and drive down to At lan tic City to gether in my new car. The other three peo ple mak ing the trip were Ger ald (Jerry) Coquin, Erhard Sittig, and Harry Tiersten[5]. Of the four of us, Jerry was the only one pre sent ing a pa per. It was a pa per on the use of tapped de lay-line struc tures as fil ters. We all had a great time and the con ver sa tions that went on, driv ing down and back and at var i ous meals to gether were thor oughly stim u lat ing and en joyable. I re gret that I did n't have the fore sight to take a tape re corder along with me.

One other odd little detail that I do re mem ber from that meet ing is that on one eve ning, look ing for some kind of en tertain ment, we went to see the movie "The Sound of Mu sic". This movie was a mu si cal star ring Julie An drews and Chris topher Plummer. It came out in 1965, a few weeks be fore the sym po sium. Be ing some thing of a Julie An drews fan, I persuaded my three com pan ions to go along with me to see the movie. I en joyed the movie. Af ter we came out of the movie, I asked my three com pan ions what they thought of it. Harry and Jerry thought it was "all right"; Erhard did n't like it. I asked Erhard why he did n't like the movie. Erhard, who grew up in Ger many dur ing the 30s and 40s, re plied, "The movie has all this beau ti ful scen ery of the Aus trian Alps and the Aus trian build ings, and the peo ple in Aus trian cos tumes, but ev ery time the ac tors opened their mouths, whether talk ing or sing ing, the

[5] Around 1965, I was ex tremely for tu nate, as a su per vi sor at Bell Tele phone Lab o ra to ries in the Ul tra sonic De vice De part ment, to have three ex traor di nar ily tal ented, pro duc tive peo ple in my su per vi sory group: Jerry Coquin, Erhard Sittig, and Harry Tiersten.

[6] In the last few years, the movie has be come a "camp film" clas sic. There is a movie the ater in Lon don, Eng land that, ev ery year, shows the film. Peo ple come dressed in the cos tumes of their fa vor ite char ac ters and the au di ence sings along with the char ac ters all of the songs in the movie.

words came out in Eng lish." The in con gru ity of it all was more than Erhard could stom ach.[6]

The 1966 Frequency Control Symposium was another sym po sium with some mem o ra ble events. The meet ing be gan on a Mon day and I ar rived in At lan tic City late Sunday af ternoon, again driv ing down from Morristown NJ where I was liv ing. Af ter I checked into the ho tel, one of the first per sons I met was Prof. Morio Onoe. I knew Morio Onoe well be cause he had been a guest Mem ber of Tech ni cal Staff in the Ul trasonic Device Department for a year. He was attending the sym po sium and was sched uled to give a pa per the open ing day. We sat down at a ta ble close to the reg is tra tion desk and started a con ver sa tion. Sud denly, I was alarmed to ob serve Morio faint and col lapse in the chair in which he was sit ting. His col lapse lasted less than a min ute and, for tu nately, turned out to be noth ing more se ri ous than fa tigue from the stress of travel. Af ter we were able to re sume our con ver sa tion, Morio asked me if I would lis ten to him as he re hearsed the pa per that he was go ing to pres ent the next day. The rea son he wanted to do this was to im prove his Eng lish pro nun ci a tion and grammar. We met in his room later that eve ning and went over his speech. I must ad mit that, at the time, I failed to ap pre ci ate the sig nif i cance of the pa per he was pre sent ing at the meet ing.

It turned out that this 1966 Frequency Control Symposium was the first meeting at which papers presenting the basic ideas and de sign the ory for the mono lithic crys tal fil ters were pre sented There were two com pet ing groups work ing on the same ba sic ideas and pre sent ing two re lated pa pers. The one group was at the Al len town lo ca tion of Bell Tele phone Lab o ra to ries with their work pre sented in a pa per co-authored by R. A. Sykes and W. D. Bea ver; and pre sented by Roger Sykes. The other group was at the Uni ver sity of To kyo with their paper co-authored by M. Onoe, H. Jumonji, and N. Kobori, and pre sented by Morio Onoe.

The in ven tion of the quartz, mono lithic crys tal fil ter is one of those cases of es sen tially in de pend ent, si mul ta neous in ven tion by two dif fer ent groups. Cer tainly, re gard less of the details of the initial invention, it was one of the important developments in the field of ultrasonic devices during the 1960s, and it was an in ven tion that spawned an in tense amount of re search and de vel op ment and that lead to the for ma tion and growth of a ma jor branch of the elec tronic com po nents indus try. Many years later, in the 1990s, a pat ent suit would be brought in a U.S. Federal Court by AT&T Bell Telephone Laboratories to es tab lish the pri or ity of Bell Sys tem pat ents and to en able AT&T to col lect roy al ties from man u fac tur ers of mono lithic crys tal fil ters, but the suit was un suc cess ful.

The 1966 Frequency Control Symposium was the last Frequency Con trol Sym po sium I at tended in the 60s. The de partment I was in at Murray Hill was undergoing a change in ac tiv ity from ul tra sonic de vices to op ti cal mem ory and dis play de vices. (To me, it seemed clear that the man age ment at Bell Tele phone Lab o ra to ries at this time was try ing to ac com plish two ob jec tives: (1) re duce the size of the ul tra sonic de vice activ ity at Murray Hill and (2) shift the fo cus of de vice de vel opment from military system applications to Bell System ap pli ca tions.) In the late '60s my per sonal de vel op ment work changed from pi ezo elec tric trans duc ers and de lay line struc-

Fig. 9. Morio Onoe (on the left) and the au thor. This pho to-graph was taken in Feb ru ary 1990, at a con fer ence on Micro-elec tro me chani cal Sys tems (MEMS) in Napa Val ley, CA. At the time Morio Onoe was the Vice-Pres i dent of Re search for the Ricoh Cor po ra tion, Ja pan.

tures to transparent ferroelectric ceramics and the de vel opment of im age stor age and dis play de vices. In spite of this and a few other ca reer changes, I did man age to at tend a few Frequency Con trol Sym po siums over the years in the de cades of the 70s, 80s, and 90s.

The emphasis in this his tory is on events that took place more than two decades ago. There is one more recent Frequency Con trol Sym po sium that I want to men tion be cause it was a great source of plea sure to me, that is the 1995 Fre quency Con trol Sym po sium that took place in San Fran cisco. This was the Symposium at which Arthur (Art) Warner received the UFFC-S Achieve ment Award. The ci ta tion that ac com pa nied it stated: "For his nearly 60 years of pi o neer ing and wide-rang ing contributions to the design and fabrication of high-stability quartz res o na tors." Art Warner was cer tainly one of the peo ple in the UFFC whom I knew over the lon gest pe riod of time. I first met Art early in 1955 when I went on a two-day se ries of in terviews to sev eral dif fer ent lo ca tions at Bell Tele phone lab o ra tories. Art Warner was one of the persons in Roger Sykes' de part ment at Whippany who in ter viewed me. I can still remem ber clearly sit ting in his of fice-lab o ra tory, talk ing to him, and look ing at the in ter est ing col lec tion of raw quartz sam ples and fin ished quartz crys tal res o na tors that he had sit ting around his lab o ra tory. One of the things that we both shared in com mon from the out set was an as so ci a tion with Lehigh Uni ver sity in Beth le hem PA. Art had done a year of grad u ate study in the Phys ics De part ment at Lehigh be fore he left to join Bell. Over the years, I had a close per sonal friend ship with Art. Af ter I left Bell and joined Ford and moved to Ann Ar bor, Art vis ited us sev eral times as a house guest when he came out to Ann Ar bor on per sonal busi ness. In ad di tion to Art Warner's con tri bu tions to the de vel op ment of quartz res o na tors and the in ves ti ga tion of new pi ezo elec tric ma te ri als, Art also made sig nif i cant con tri bu tions to the de vel op ment of IEEE Stds 176-1978 and 176-1987. Art Warner certainly well-deserved the Achieve ment Award and I was very pleased to be pres ent when he re ceived the award and to be able to congratulate him. Another close personal

friend, who was pres ent at the 1995 FCS and helped to make it an en joy able time, was my old friend Harry Tiersten. We had a few ex cel lent din ners in some of San Fran cisco's fin est res taurants, one of the din ners in the com pany of John Vig, the General Chair man of the meet ing. Af ter the meet ing ended, Harry and I spent one day vis it ing nearby Muir Woods and en joy ing a walk through the mag nif i cent for est of Se quoias.

Most re cently, in 2001, I at tended the Fre quency Sym posium in Se at tle. Very few of my friends from the '60s and '70s were there. Harry Tiersten was there and even gave a pa per in spite of suf fer ing from a phys i cal prob lem. Eric Hafner was there. At one of the eve ning so cial events, I was pleased to meet again W. (Bill) D. Bea ver, one of the peo ple in volved in the early de vel op ment of the quartz mono lithic crys tal fil ter and now (in 2001) run ning a quartz res o na tor man u fac tur ing plant in Sin ga pore.

6. Mem o ries of Early Ferro elec trics Com mit tee and ISAF Meetings

From the be gin ning of my ca reer at Bell Tele phone Lab o ra tories I had a strong in ter est on the ap pli ca tion of ferro elec tric ma te ri als to elec tronic de vices. My pri mary in ter est in ferroelec tric ma te ri als in the early stages of my ca reer, dur ing the pe riod from 1955 to 1965, was as trans duc ers for ul tra sonic de lay lines. A num ber of my early pub li ca tions are on the subject of the mea sure ment and char ac ter iza tion of ferro elec trics as transducer materials. Then too, the department at Bell headed by Roger Sykes, at the time I joined it in Oc to ber 1955, had an ac tiv ity con cerned with the de vel op ment of ferro electric memory devices. Two close friends engaged in the $BaTiO_3$ memory device activity were Henry Stadler and Thyrgve (Trig) Meeker. It was natural enough, when Prof. Charles Pulvari of Catholic University, Washington, D.C., pro posed the for ma tion of a Ferroelctrics Com mit tee to promote fur ther ac tiv ity in the IEEE GSU, that I be came one of the in di vid u als in volved in the for ma tion and de vel op ment of the com mit tee. Dur ing that time pe riod, I was serv ing as Secre tary-Trea surer of the Group and this ac tiv ity also made it use ful for me to be in volved.

The ear li est meet ings of the Ferro elec trics Com mit tee took place in a small con fer ence room, (The con fer ence room couldn't have been much larger than about 8 by 12 ft.) off the main office of the De part ment of Elec tri cal En gi neer ing, at Cath o lic Uni ver sity. Prof. Pulvari was the Chair man of the De part ment. From the out set, I be lieve that Prof. Pulvari had in mind as a major ob jec tive of the com mit tee, the en hance ment of the ferroelec trics ef fort within the GSU by build ing a sep a rate meet ing on ferroelectrics. Among the very early people involved in these meet ings, in ad di tion to Prof. Pulvari and my self, were peo ple like Cecil Land of Sandia, Prof. L. Eric Cross of Pennsyl va nia State Uni ver sity, Stu art Kurtz of Philips Lab o ra tories, and George Tay lor of RCA Lab o ra tories.

The re sult of this ef fort lead to the first "Sym po sium on Ap plica tions of Ferro elec trics", held some time dur ing 1968. This was a two day meet ing (a morn ing and af ter noon ses sion on two days, with no par al lel ses sions) held at Cath o lic Uni ver sity in an au dito rium in one of the en gi neer ing build ings on the cam pus. Prof. Pulvari was the Gen eral Chair man and Henry Stadler was the Pro gram Chair man. I re mem ber that I gave a pa per on the ap plica tion of ferro elec tric ma te ri als in ul tra sonic de vices op er at ing above 100 MHz. As I re call there was a ban quet and, if I re member cor rectly, it was held in the din ing room of a nearby mo tel. The meet ing wound up mak ing a loss of few hun dred dol lars. The fact that the meet ing wound up with a loss greatly dis tressed Prof. Pulvari; so much so, that Henry Stadler volunteered to make up the def i cit by mak ing a per sonal con tri bu tion. In those days, the fi nan cial sit u a tions of the GSU and the par ent IEEE were pre car i ous and bud gets were tight. The next "Sym po sium on Ap pli ca tions of Ferro elec trics was not held un til 1971. This too was a low cost meet ing held us ing the au di to rium fa cil i ties at the IBM Watson Research Laboratory. A. W. Smith was the Gen eral Chair man and L. E. Cross was the Pro gram Chair man. I was there, but I re ally re mem ber very lit tle about this meet ing. The pa pers from this meet ing were col lected and pub lished in Vol. 3 parts 2, 3, 4 of the jour nal "Ferro elec trics".

The re cord of the first ferro elec trics sym po siums is in complete and not ac ces si ble even in the UFFC Dig i tal Ar chive. There is no col lec tion of the pa pers from the first sym po sium and not even a pro gram that I know of. The pa pers from the 1971 meet ing and the '75, '79, and '83 meet ings were pub lished in "Ferro electrics" and, as a re sult, are not in the UFFC Dig i tal Ar chive. To some peo ple look ing back on this sit u a tion, this may seem as if the or ga niz ers of these early meet ings were lax in mak ing proper ar range ments. My per cep tion, as some one who at tended committee meet ings in those days is some what dif fer ent. The at ti tude of the par ent GSU AdCom to wards the Ferro elec trics Com mit tee was some thing like the at ti tude of a par ent to wards an un wanted step child. Many of the AdCom mem bers felt that the ferro electrics ac tiv ity was not all that rel e vant to the main ac tiv ity of the GSU, but they were will ing to tol er ate it as long as the ferro electrics ac tiv ity was able to con duct its meet ings on a ba sis that did not bur den the GSU with fi nan cial losses. The de sire to avoid losses from pub li ca tion costs was the ma jor rea son for trans ferring the copy right to the pa pers col lected at sev eral early ferroelec trics sym po siums. The sym po sium or ga niz ing com mit tees pro vided the au thors of pa pers with an ex pense-free pub li ca tion in ex change for the copy rights.

One in di ca tion of the low sta tus held by the ferro elec trics ac tiv ity in the GSU scheme of things can be found in search ing for any men tion of the Ferro elec trics Com mit tee in is sues of the GSU News let ter. Early is sues of the GSU News let ter can be found in the UFFC Dig i tal Ar chive. No men tion of the ex istence of a Ferro elec trics Com mit tee or of a ferro elec trics symposium can be found in the News let ter un til the June 1971 is sue. In a rou tine list ing of the com mit tees as so ci ated with the GSU, the ex is tence of the Ferro elec trics Com mit tee is fi nally ac knowl edged and listed as fol lows:

C. F. Pulvari, Chair man

G. Burns	A. H. Meitzler
L. E. Cross	R. E. Nettleton
S. E. Cummins	A. W. Smith
H. Jaffe	H. L. Stadler
C. E. Land	G. W. Tay lor
W. N. Law less	H. H. Wieder
I. Lefkowitz	

	Date	Location	General Chair/Co-Chairs	Program Chair/Co-chairs	Proceedings
1st	1968	Catholic University,	C. Pulvari	H. Stadler	-
2nd	June 7, 1971	IBM Watson Research Labs.	A. W. Smith	L. E. Cross	Ferroelectrics Vol. 3 parts 2,3,4 1972
3rd	June 9, 1975	Albuquerque, NM	C. E. Land, and A. M. Glass	L. E. Cross	Ferroelectrics Vol. 10, 11 1976
4th	June 13, 1979	Minneapolis, MN	S. T. Liu	L. E. Cross	Ferroelectrics 27, and 28, Jan. 1980
5th	June 1, 1983	Gaithersburg, MD	R. C. Pohanka	W. N. Lawless	Ferroelectrics Vol.49, 50, and 51
6th	June 8, 1986	Lehigh University , PA	W. A. Smith	R. E. Newnham	IEEE
7th	June 6, 1990	University of IL at Urbana-Champain, IL	D. Payne	S. K. Krupanidi, and S. Kurtz	IEEE
8th	August 30, 1992	Greenville, SC	G. Haertling	A. Kingon	IEEE
9th	August 7, 1994	Penn State University, PA	A. Bhalla	A. Bhalla and R. Guo	IEEE
10th	August 18, 1996	Rutgers University/East Brunswick New Jersey,	A. Safari	T. Shrout and T. R. Gururaja	IEEE
11th	August 24, 1998	Montreux, Switzerland	N. Setter	N. Setter and D. Damjanaovic	IEEE
12th	July 30, 2000	Honolulu, Hawaii	A. Kingon and D. Viehland	S. T. McKinstry, S. Pilgrim and N. Ichinose	IEEE
13th	2002	Kyoto, Japan	D. Payne and T. Takenaka	-	IEEE
14th	2004	Montreal, Quebec Ontario	S. Pilgrim and W. A. Schulze	-	IEEE

Ta ble 2. A Sum mary of In for ma tion about ISAF Meet ings (Pre pared by L. E. Cross)

Ta ble 2, shown above, is a sum mary list ing of the "In ter national Sym po siums on Ap pli ca tions of Ferro elec trics" from 1968 to 2004. I believe the emphasis on the growth of the meeting and the emphasis on its international nature began with the 1975 meet ing. One thought that strikes me when I look at this ta ble is that I was very for tu nate, in spite of the fact that my ca reer ac tiv i ties changed dras ti cally when I went from Bell Lab o ra to ries to Ford Re search in No vem ber, 1972, I was still able to at tend all of the ISAF meet ings from 1968 to 1998. I missed the meet ing in Ha waii in 2000 and I doubt that I will make the meet ing in Kyoto, Ja pan in 2002.

Look ing back over this list of ISAF meet ings, I have many pleas ant mem o ries and I won't at tempt to re late, at this time, one or two sto ries from each of the meet ings. There is, however, one meet ing that I es pe cially want to talk about and that is the 1975 ISAF held in Al bu quer que NM and co-chaired by my good friend Cecil Land.

Dur ing the de cade of the '60s, an im por tant de vel op ment in the field of ferroelectric ceramics was the in ven tion, de vel op ment, characterization, and application of PLZT ceramics by Gene Haertling and Cecil Land at the Sandia Cor po ra tion in Albuquerque, NM. My last few years on the staff of BTL were spent work ing pri mar ily on the de vel op ment of PLZT op ti cal memory and display devices. By chance, even though I was work ing at Ford Mo tor Co. on ce ramic sen sors for au to mo tive emis sion con trol sys tems, I was able to put to gether a con trib uted

Fig. 10. Cecil E. Land. Cecil Land worked at Sandia Na tional Lab o ra tories for 35 years be fore re-tir ing as a Dis tin guished Mem ber of Tech ni cal Staff in 1991. This pho to graph was taken around the time of his re tire ment.

paper entitled "Structural Trans - for ma tions oc ca sioned by Crys tal-lo graphic Shear in PLZT and TiO_2 Ce ram ics".(I be lieve this was the last paper that I ever gave at an ISAF meet ing.) How ever, my rea-son for want ing to talk about the 1975 ISAF does not involve me, but rather Cecil Land.

On one of the eve nings dur ing this meet ing, Cecil Land hosted, at his own ex pense, for a group of about fifty people, a dinner. This banquet was co-hosted by Cecil and his wife Betty and given at their ex pense as an ex-pres sion of their thanks to all the individuals present for their friend ship and sup port. The peo-ple pres ent in cluded mem bers of the Ferroelectrics Committee, mem bers of the the sym po sium com mit tee, close as so ci ates on the staff at Sandia and even a few mem bers of Sandia man age ment. I al ways thought this was a re mark ably gen er ous, warm-hearted, and no ble-spir ited thing for Cecil and his wife to do

An other mem o ra ble thing that hap pened at this meet ing, is that one eve ning, I don't re mem ber which one, James (Jim) C. King in vited War ren Ma son and me to his house for cock tails and con ver sa tion. Jim was a mem ber of Roger Sykes' de part-ment at the time I joined BTL and spe cial ized in study ing de-fect struc tures in sin gle-crys tal quartz. He was made the first head of the Ul tra sonic De vice De part ment set up at Al len town to man u fac ture de lay lines and, later, trans ferred with a pro-mo tion to Di rec tor to Sandia. If I re call cor rectly, Jim had a col lec tion of an tique ri fles, which he showed to War ren ma son and me; and, all in all, it was a pleas ant eve ning of drinks and conversation.

I have many pleasant memories of all the Ferroelectrics Sym po siums that I at tended. It was to mem bers of the Ferro-elec trics Com mit tee, and pri mar ily to Cecil Land, that I am in-debted for the sup port needed to re ceive the award of the IEEE Fellow Membership Grade. Over our years of association, Cecil and I formed a deep friend ship. It is that fact that makes me want to say a few words about the ISAF that took place at Lehigh Uni ver sity. Lehigh Uni ver sity was the place where I attended graduate school as a Physics major and earned a Ph.D. It was a memorable meeting for several rea sons. The food at the so cial hour and the ban quet was out stand ing. In ad-di tion, and what is much more im por tant, it was the last sym-posium that Cecil Land attended before his illness with em phy sema forced him into re tire ment. I do re mem ber, one eve ning we sat to gether in a large room in the Ad min is tra tion building on the Lehigh campus and talked for a long time about the many ex pe ri ences we had shared and the peo ple we had known. I think Cecil sensed that this was prob a bly go ing to be the last time we would see each other; and in deed, that turned out to be the case. Cecil was a fine man, a pro duc tive, cre ative sci en tist and, a great friend, and I never at tend a Ferro-electrics Symposium or a Ferro elec trics Com mit tee with out think ing of him and wish ing that he were still with us.

The Fi nal in stall ment of Al Meitzler's rec ol lec tions will ap-pear in the Fall 2003 UFFC News let ter.

AROUND IEEE

IEEE *Xplore*®

IEEE *Xplore*® pro vides full-text ac cess to IEEE trans ac tions, jour-nals, mag a zines and con fer ence pro ceed ings pub lished since 1988 and all cur rent IEEE Stan dards, over 922,177 doc u ments avail able. Visit IEEE Xplore at http://www.ieeexplore.ieee.org/Xplore

FREE TO ALL: Browse and ac cess ta bles of con tents of IEEE trans ac tions, jour nals, mag a zines, con fer ence pro ceed-ings and stan dards.

IEEE MEM BERS: Browse or search to ac cess any IEEE abstract/citation re cord as well as ar ti cles from IEEE Spec-trum Mag a zine. Ac cess your per sonal on line sub scrip tions us-ing your ac tive IEEE Web Ac count. If you do not have one, go to "Es tab lish IEEE Web Ac count" to set up an ac count.

John Vig re ports some sta tis tics for Xplore us age com par ing us age in Oc to ber 2001 and 2002.

IEEE *Xplore* us age for Oc to ber was:

	2002	**2001**
PDFs ac cessed:	2,131,390	1,448,085
To tal Mega bytes served:	1,457,534	1,029,382
To tal pages viewed:	14,359,125	10,363,514

The IEEE Member Digital Library

New in 2003, the new IEEE Mem ber Dig i tal Li brary will al low IEEE members to access individual online articles from IEEE-published journals, magazines and conference pro ceed-ings with one convenient subscription. Subscribers will pay a monthly fee to ac cess up to 25 ar ti cles and pa pers a month from the cur rent year and the last five years worth of pub li ca tions. Ac-cess will be through the IEEE *Xplore*® on line de liv ery plat form.

"This new of fer ing will greatly en hance the sci en tific and ed u ca tion goals of the IEEE," said Dr. Ray mond D. Findlay, IEEE Past Pres i dent. "In ad di tion, IEEE pub lishes the most highly cited in for ma tion in EE and Com puter Sci ence, and on-line ac cess to a wider range of in for ma tion will greatly en-hance our mem bers' ca reers."

The IEEE Mem ber Dig i tal Li brary pro vides IEEE mem-bers with direct online access to the articles and papers in IEEE jour nals and con fer ence pro ceed ings with out re quir ing sub scrip tions to the in di vid ual pub li ca tions.

"IEEE mem bers tell us that the num ber one rea son they join is to gain ac cess to tech ni cal data," said Findlay. "The IEEE

Mem ber Dig i tal Li brary will prove to be a marked ad di tion to the in for ma tion IEEE mem bers al ready gain from in di vid ual jour nal sub scrip tions and tech ni cal so ci ety mem ber ships."

IEEE mem bers re new ing or join ing for the 2003 year will be el i gi ble to sub scribe to the IEEE Mem ber Dig i tal Li brary. The ser vice will be avail able in Jan u ary 2003.

For more in for ma tion on the IEEE Mem ber Dig i tal Li brary visit www.ieee.org/ieeemdl

IEEE Po ten tials Maga zine

CALL FOR MANU SCRIPTS

Solic i ta tion of Manu scripts for IEEE Po ten tials Maga zine

The IEEE Po ten tials Mag a zine goes to all stu dent mem bers of the IEEE (USA and Can ada), pres ently over 50,000.

The level of the article is addressed to the un der grad u ate/grad u ate stu dent and has sev eral ob jec tives:

- In ter est ing the stu dent in a topic for fur ther study
- Ex plain ing tech no log i cal ad vances in an area
- A fo rum for tech ni cal ideas
- Ar ti cles of in ter est tech ni cally and pro fes sion ally

It should be stressed that the ar ti cle should not try to mys-tify the stu dent, but to en able the stu dent to learn more about technical material that he/she may/may not become ac-quainted with in their for mal course work.

Length of ar ti cle can be no more than 10 manu script pages (8 ½ by 11) re duced by the num ber of fig ures – shorter pa pers are also ac cept able.

The manuscripts are reviewed by: students, faculty, re-search ers in the area and then a de ci sion is made as to whether to pub lish, or not.

If in ter ested, con tact:

Dr. George W. Zobrist
Pro fes sor Emer i tus
Ed i tor-in-Chief, IEEE Po ten tials Mag a zine
12030 Coun try Club Drive
Rolla, MO 65401
Ph: 573-364-6905
Fax: 573-341-4501
Email: zobrist@umr.edu

IEEE Quick Facts 2002

Over 382,000 mem bers
In clud ing more than 72,000 stu dent mem bers
38% of mem bers from out side US
Plus over 32,000 af fil i ates
298 sec tions
More than 1,300 chap ters
Over 1,150 Stu dent Branches
37 IEEE So ci et ies plus 4 IEEE Tech ni cal Coun cils
113 Periodicals
113,658 pages pub lished in 2002
Over 900,000 doc u ments in the IEL
Over 320 Con fer ences each year
$225M+ Bud get

Editor's Comments

Jan Brown, Newsletter Editor.

Opportunity to Volunteer

In this issue you will notice that a number of articles and reports are ask ing for vol un teers. There are over 392 vol un teer po si tions in the So ci-ety plus the roughly 668 po ten tial re-viewers of the Transactions reg is tered with Manu script Cen tral. Given that our Society has a little over 2300 mem bers, this means that roughly 46% of our membership is serving in some volunteer capacity. It is the ef forts of all the vol un teers that keep our society technically strong and vibrant. There are more op por tu ni ties to serve. There are va cant po si tions on the var i-ous com mit tees of AdCom and es pe cially Stan dards. Please let any So ci ety of fi cer know of your de sire to serve.

2003 marks the 50th an ni ver sary of the So ci ety. The cel e-bra tion of this mile stone will take place at the Joint Con fer-ence of all three of our tech ni cal com mu ni ties in Mon treal in Au gust 2004. Fred Hickernell, on be half of the UFFC His tory Com mit tee, is ask ing you for **short anecdotal stories and personal remembrances** (se ri ous, in ter est ing, and funny) of peo ple and places as so ci ated with our so ci ety and/or its tech-nol o gies. Now is your op por tu nity to con trib ute to the his tor i-cal ar chive of UFFC. Please take this op por tu nity to an swer Fred's solic i ta tion for con tri bu tions.

Thank you

Thank all of you who sent ar ti cles and pho tos in for this is-sue. The pho tos cap ture what words can not and pro vide a way for us to see each other. Thanks to the photographers and photo contributors of this issue Clemens Ruppel, Reinhard Lerch, Ken Yamada, Mike Garvey, Sorah Rhee, John Vig, Steve Jefferts, Kirk Shung, Ewald Benes, Kang-Lyeol Ha, Jan Brown, Al Meitzler, and Gerry Bless ing. Spe cial ap pre ci a tion to Andrea Wat son and her col leagues at IEEE head quar ters for the pro duc tion work and for their pa tience as we dil i gently missed dead lines.

Please con tinue to send me (jan.brown@ieee.org) in for ma-tion and pho tos as events oc cur so that we may post them on the Web and in clude them in the Fall News let ter.

Jan Brown
UFFC-S Newsletter Editor

Future UFFC-S Symposia

2004 IEEE International Ultrasonics, Ferroelectrics, and Frequency Control 50th Anniversary Joint Conference

UFFC-S's 50th anniversary celebration

2003 marks the 50th anniversary of the Ultrasonics, Ferroelectrics, and Frequency Control Society. To honor the occasion all three major UFFC-S sponsored symposia will join together for a single conference to be held in August in Montreal Canada.

Location: Palais des Congrès de Montréal
Montréal, Canada
24-27 August, 2004
Tutorials and Short Courses on August 23, 2004

Dates: Tutorials/Short Courses: Monday 23 August 2004
Technical Sessions: Tuesday-Friday 24-29 August 2004

General Chair:

R. Michael Garvey
Research and Engineering
Symmetricom
34 Tozer Road
Beverly, MA 01915
email: rmgarvey@symmetricom.com

Technical Program Chairs:

Ultrasonics
Ton van der Steen
Thorax centre Ee 23.02
Erasmus University Rotterdam
P.O.Box 1738
3000 DR Rotterdam
The Netherlands
E-mail: vandersteen@tch.fgg.eur.nl

Ferroelectrics
Steve Pilgrim
Alfred University
NYS College of Ceramics
120 McMahon Building
2 Pine Street
Alfred, NY 14802
E-mail: pilgrim@alfred.edu

Walter Schulze
Alfred University
NYS College of Ceramics
120 McMahon Building
2 Pine Street
Alfred, NY 14802
E-mail: schulze@alfred.edu

Frequency Control
Chris Ekstrom
US Naval Observatory
34th and Massachusetts Ave.
Washington, DC 20392-5100
E-mail: ekstrom@atom.usno.navy.mil

FREQUENCY CONTROL SYMPOSIA

2003 IEEE International Frequency Control Symposium and PDA Exhibition Jointly With the 17th European Frequency and Time Forum

Location: Marriott Waterside Hotel,
Tampa, Florida, USA

Dates: Tutorials: May 4 (Sunday);
Technical sessions: May 5-8 (Mon-Thur)

General Chairs:

R. Michael Garvey
Research and Engineering
Symmetricom
34 Tozer Road
Beverly, MA 01915
email: rmgarvey@symmetricom.com

Raymond Besson
Laboratoire de Chronometrie
Electronique Piezoelectricite
26 chemin de l'Epitaphe
25030 Besancon Cedex
France
rbesson@ens2m.fr

Technical Program Chair:

Pierre Thomann
Observatoire de Neuchatel
rue de l'Observatoire 58
CH-2000 Neuchatel - Switzerland
pierre.thomann@ne.ch

US Liaison for the Technical Program:

Christopher Ekstrom
US Naval Observatory
34th and Massachusetts Ave.
Washington, DC 20392-5100
ekstrom@atom.usno.navy.mil

ULTRASONICS SYMPOSIA

2003 IEEE International Ultrasonics Symposium

October 5-8, 2003
Honolulu, Hawaii

General Co-Chairs:

James F. Greenleaf
Mayo Clinic
Phone: (507) 284-8496
FAX: (507) 266-0361
jfg@mayo.edu

William D. O'Brien, Jr.
University of Illinois
Department of Electrical & Computer Engineering
Bioacoustics Research Laboratory
405 North Mathews Avenue
Urbana, Illinois 61801-2991, USA
Phone: (217) 333-2407
Fax: (217) 244-0105
Email: wdo@uiuc.edu

The INSTITUTE OF ELECTRICAL & ELECTRONICS ENGINEERS, Inc.
445 Hoes Lane, P.O. Box 1331 • Piscataway, NJ 08855-1331, USA

Non-Profit Org.
U.S. Postage
PAID
Easton, PA
Permit No. 7