

# The 2001 IMS Technical Program

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## I. INTRODUCTION

THE 2001 IEEE Microwave Theory and Techniques Society (IEEE MTT-S) International Microwave Symposium (IMS2001) was held in Phoenix, AZ, in May 2001. This year's symposium broke the record of total number of papers submitted and total number of student papers. The electronic paper submission procedure used last year was enhanced significantly to make the submission process easier for the authors. The untiring work of many volunteers resulted in the smooth operation of the Technical Program Committee (TPC) meeting and the paper selection process. The excellent technical program that was presented at the IMS2001 is the result of the hard work of the authors who submitted their papers and the TPC members.

## II. ELECTRONIC MEDIA REVOLUTION

This year, we significantly enhanced our electronic paper submission, evaluation, and acceptance process. We also introduced a web-based paper grading and selection procedure for the first time. A comprehensive software program based on Lotus Notes was developed to handle the paper grading and selection process. Fig. 1 shows a block diagram of the procedure we established to select papers for the IMS2001. Authors submitted their papers at a central website located in Washington, DC. The IMS2001 technical program administration team handled all the logistics from Phoenix, AZ. A software engineer in Austin, TX, controlled the software program for paper grading and acceptance. The papers and software programs were archived at different sites as backups. The IMS and RF integrated circuit (RFIC) TPC members were divided into 38 different subcommittees to review over 1000 papers. TPC members were given secure user IDs and passwords to access the papers that belonged to their respective subcommittees. The scores were posted on the secure website along with the comments from the reviewers. TPC administration team compiled all the scores, and the composite scores were distributed back to the respective subcommittees chairs and members. At the TPC meeting, each subcommittee was provided with a laptop to access the website for online paper selection. Each subcommittee was able to access the score of each paper and the actual paper for further review. After the committee deliberations, disposition of each paper was entered at the website by the respective committee chairperson. Since all the computers were linked together, transfer of papers to another subcommittee could be done instantaneously. This online paper grading and selection process decreased the workload on

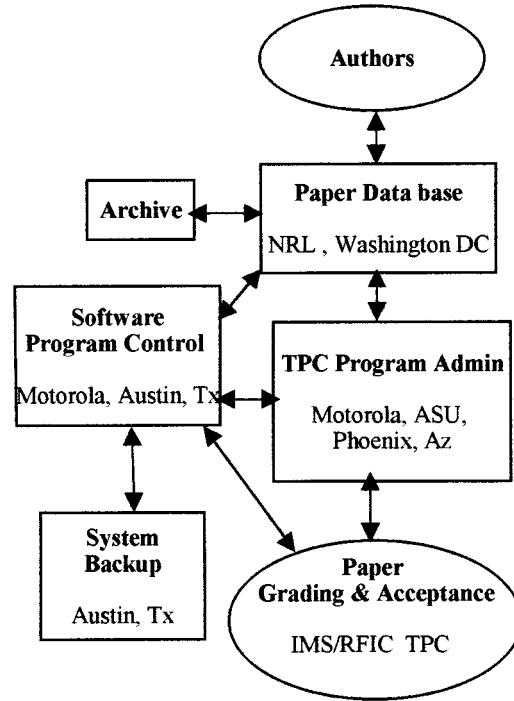


Fig. 1. TPC paper selection process.

the committee members significantly. The author notification of the disposition of papers was also done electronically. Authors and committee members enthusiastically embraced this new approach.

## III. IMS2001 SYMPOSIUM DEDICATION

This year's symposium and digest were dedicated to Al Gross, one of the pioneers of wireless communications. Al Gross began his career in radio communication as an amateur radio operator. By the time he reached high school, he was a licensed ham-radio operator, who designed and built his own equipment. In 1938, while only in his teens, he invented a hand-held mobile radio operating above 200 MHz, an unexplored part of the RF spectrum at that time. Other ham-radio operators, commenting on Al Gross' habit of walking and talking at the same time, inspired the name of his invention: "Walkie Talkie."

The U.S. Department of Defense recruited Al Gross to the Office of Strategic Services (OSS) in late 1930. He helped develop a ground-to-air battery-operated radio that could transmit up to 30 miles. With the outbreak of World War II, Al Gross helped design the highly secretive "Joan-Eleanor," the ultra-high frequency miniature two-way radio system. These radios were successfully used to communicate between highflying aircraft and OSS personnel on the ground. This



Fig. 2. Al Gross and many of his inventions.

“Joan-Eleanor” was considered one of the most spectacular radio developments during the wartime. After the war, Al Gross started his own company to develop handheld radio technology. He created a citizen’s band radio and invented a prototype pager. One of his inventions, the two-way wristwatch radio, was immortalized in Chester Gould’s famous cartoon strip “Dick Tracy.”

Fig. 2 presents a photograph of Al Gross and many of the original wireless products he invented. Al Gross had many revolutionary ideas. He was so far ahead of his time that most of his important patents expired before the world was ready for his inventions. Most of them ran out by 1971, and he was not able to gain any financial rewards for his inventions.

Al Gross was the recipient of numerous awards and recognition over the years for his inventions and innovations. He became an IEEE Fellow in 1982 “for pioneering VHF and UHF portable and mobile two-way radio.” Some of the important awards he received include a Commendation from President Reagan (1981), the Marconi Gold Medal (1995), the 1999 IEEE Edwin Howard Armstrong Achievement Award, and the Lemelson-MIT Lifetime Achievement Award (2000).

#### IV. TECHNICAL SESSIONS

The IMS2001 TPC put together an excellent technical program that covered a broad spectrum of topics that are important to the microwave community. The technical program, the “brain” of the IMS2001 symposium, while upholding the very high standards of the IMS conferences, broke several records set by previous conferences.

A record high number of 937 papers were submitted to the IMS2001. In addition, the RFIC symposium received 115 paper submissions. The student paper submissions have grown to 242 papers, another new record. The IMS2001 TPC consisting of over 250 professionals in 32 different subcommittees reviewed the papers for their technical merits and interest to the IMS community. A total of 511 papers (55%) were accepted for presentations. The quality of the papers submitted was very good, including some of the papers we were not able to accommodate in this year’s symposium. Our thanks goes out to all of the au-

thors who submitted papers to this symposium and also to the members of the TPC for their timely review of the paper.

In addition to bringing the latest results in established microwave areas, the following topics were highlighted in the IMS2001 symposium: “MEMS Component and Technologies,” “High Power Amplifiers for Commercial Applications,” “Microwave Phonics,” “Smart Antennas,” and “Broadband Communications Systems.” Five special sessions were selected in advance by the TPC. Papers were invited for these special sessions. These papers were reviewed along with the regular session papers.

The IMS2001 conference began on the Sunday of the “Microwave Week” with Workshops and Short Courses. These sessions were continued on Monday along with the RFIC symposium. The IMS regular sessions started on Tuesday jointly with RFIC. In order to accommodate the increased number of papers, we added one more parallel track to the traditional five tracks. To encourage more interactions and stimulate discussions, 196 papers were presented in three interactive forum sessions, Tuesday through Thursday. Student papers were sprinkled in with the regular session papers.

#### V. WORKSHOPS AND SHORT COURSES

The IMS2001 followed the previous year’s conferences by offering Workshops and Short Courses on a wide variety of topics. This year, Short Courses were listed separately from Workshops to highlight the difference in content with Short Courses being more tutorial in nature. The 20 Workshops (14 full day and six half day) and five Short Courses (five full day) were scheduled on Sunday, Monday, and Friday. The Workshop and Short Course organizers and TPC members are to be congratulated for adhering to a tight schedule that required proposals as early as September 2000 and final submission of all material for Workshop notes in early March 2001. Each Workshop and Short Course attendee received a hardcopy of the notes for the session that they attended plus a CD-ROM that contained notes for all 20 Workshops and all five Short Courses. Care was taken in selecting Workshop and short-course topics so that they complemented the regular technical and special sessions.

#### VI. PANEL AND RUMP SESSIONS

Five noon-time Panel Sessions held Monday–Thursday were well attended. Attendees were able to enjoy their lunch and also stimulating presentations from panels of experts on “RF CMOS for Bluetooth,” “One Chip Radio,” “Automotive Radar,” “University–Industry Relations,” and “Commercial Exploitation of 92–94 GHz Spectrum.” The Tuesday evening Rump Session entertained presentations and discussion of the “Challenges and Opportunities for Microwave CAD.” These topics again were selected to complement the regular technical sessions and Panel Sessions.

#### VII. STUDENT PAPER COMPETITION

Two hundred and forty-two student papers were submitted to the competition this year. Of these submissions, 140 were ac-

cepted for presentation in the regular technical sessions or the interactive forum, and the TPC selected 26 semifinalists. The 26 semifinalists were required to make an oral presentation of their work and to participate in the interactive forum. A panel of judges selected the six best student papers from among the finalists. Cash and special prizes were presented at the Thursday student awards luncheon. The National Science Foundation (NSF) and the IEEE MTT-S provided travel subsidies for all of the finalists.

### VIII. SPECIAL SESSIONS

Each year, several Special Sessions are dedicated to technical areas because of increased importance or timeliness. The IMS2001 saw five technical Special Sessions and one honorary Special Session for Al Gross who passed away suddenly after a short illness in late 2000. Al Gross is considered the "founding father" of wireless communications. The five technical Special Sessions covered the following topics: "Internet Via Satellites," "Microwave and Optical Broadband Internet Access," "The NBS/NIST Centennial," "Frequency Control Advances for Wireless Applications," and "Acoustic Devices for Wireless Communications and Sensing."

### IX. OVERALL TECHNICAL PROGRAM

This year's IMS2001 Technical Program was a success both in size and technical content. Attendees can benefit from the technical content for years to come by referring to the CD-ROMs that were available for the Workshops and Short Courses and regular technical sessions. If they prefer, attendees can also refer to all of the technical papers in the three-volume traditional paper digest. This year, as in past years, the IMS2001 featured the IEEE MTT-S Historical Exhibit, but in addition, an exhibit from the National Institute of Standards Technology (NIST) was also available to attendees. NIST, formerly the National Bureau of Standards (NBS), is celebrating its centennial year. There was also an exhibit of the original inventions and awards of Al Gross.  $\mu$ APS sessions continue to be a forum for exhibitors to present technical topics related to their products, with sessions running through the days of the exhibition.

The success of the IMS2001 Technical Program is a direct result of the efforts of hundreds of volunteers responsible for its production, the authors of the technical presentation who provided the content, and the thousands of attendees who listened and networked with each other mutually enhancing their respective technical backgrounds. A great big thanks to all of you for making the IMS2001 the success that it was!



**Vijay K. Nair** (M'81–SM'91–F'00) received the M.S. degree in physics and M.S. degree in electrical engineering from the University of Minnesota at Minneapolis–St. Paul, in 1979 and 1981, respectively.

From 1981 to 1984, he joined the Bendix Advanced Technology Center to conduct research in GaAs and InP devices and integrated circuits (ICs). In 1984, he joined the Motorola Semiconductor Research and Development Laboratories to continue his research in compound semiconductor devices and circuits. From 1992 to 1996, he led the RF Technologies Group, Motorola Phoenix Corporate Research Laboratories. His research responsibilities include development of state-of-the art low-noise devices and monolithic integrated circuits for wireless communication applications. He later concentrated on the development of low-voltage high-efficiency power-amplifiers-based heterojunction power FETs. He then initiated the transfer of these technologies to the manufacturing line. His current responsibilities include development of quantum functional devices and circuits for RF and microwave applications. He has authored, co-authored, or pre-

sented over 60 papers in various technical journals, book chapters, and conferences. He has been very active as an instructor for short courses in the design of low-power RFICs and power amplifiers offered to working engineers. From 1994 to 1999, he was an instructor in short courses on "RFIC designs for wireless communications," organized by Mead Microelectronics Inc., in both Monterey, CA, and Lausanne, Switzerland. In 1995 and 1997, he was also a course instructor for short courses offered by Oregon State University, Corvallis, in RFIC designs. He holds 11 U.S. patents with six pending.

Mr. Nair is a Fellow of the IEEE. He is a member of the IEEE Electron Devices Society, the IEEE Microwave Theory and Techniques Society (IEEE MTT-S), and the IEEE Vehicular Technology Society. He served as chairman of the Waves and Devices Chapter of the Phoenix IEEE section in 1989 and as chairman of IEEE Phoenix section in 1993. He was the Technical Program Committee (TPC) chairman and general chairman of the RFIC Symposium in 1997 and 1998, respectively. In 1997, he also served as the TPC chair of the Vehicular Technology Society Conference. He was the Technical Program Chair of the 2001 International Microwave Symposium, Phoenix, AZ. He is an elected member of the International Union of Radio Sciences (URSI) Commission A (2000) and is its elected secretary (2001). From 1996 to 1999, he co-chaired the Technical Working Group (TWG) on RF Components, National Electronic Manufacturing Initiative (NEMI) Inc. In 2000, he was elected the chairman of RF Components TWG, NEMI. He served on the TPCs of the IEEE RFIC symposium, International Microwave Symposium (IMS), and Vehicular Technology Symposium (VTS). He is currently a member of the Editorial Board for the IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES. He was the recipient of the 1991 Motorola Product and Process Technology Award and the 1999 Distinguished Innovator Award. He was also the recipient of the 1998 Senior Engineer of the Year Award of the IEEE Phoenix section.



**Charles E. Weitzel** (M'78–SM'83) received the B.S.E.E. degree from the Georgia Institute of Technology, Atlanta, in 1967, and the M.S. and Ph.D. degrees from North Carolina State University, Raleigh, in 1971 and 1973, respectively.

Upon graduation, he joined RCA Laboratories, Princeton, NJ, where he contributed to materials, fabrication, and device development of silicon-on-sapphire CMOS digital circuits. He also pioneered work on platinum–silicide gate CMOS/SOS. In 1978, he joined the Semiconductor Research and Development Laboratory, Motorola Inc., Phoenix, AZ, where, in 1982, he was a key contributor to the introduction of Motorola's first commercially available GaAs MESFET (MRF966). For the following ten years he contributed to a wide variety of GaAs discrete and monolithic microwave integrated circuit (MMIC) MESFET and heterostructure FET (HFET) projects. In 1992, he initiated silicon–carbide device development at the Phoenix Corporate Research Laboratories, Motorola Inc. The collaboration between his group and Motorola's Power Products Division resulted in the introduction of Motorola's first GaAs Schottky rectifier product in 1995. From 1992 to 1998, he led Motorola's silicon–carbide Schottky diode, RF MESFET, and high-voltage MOSFET development activities, which were partially government funded by the Office of Naval Research (ONR) and the Defense Advanced Research Projects Agency (DARPA). He is currently leading GaAs device development activities at the Compound Semiconductor Technology Laboratory, Motorola Inc., Tempe, AZ. He has authored or co-authored over 75 technical papers and holds 42 U.S. patents.

Dr. Weitzel was the Technical Program co-chair of the IMS2001, Phoenix, AZ.