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NATIONAL CAPITAL AREA COUNCIL

SCANNER

December 1996/January 1997

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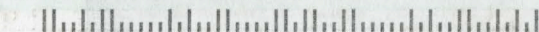
A Joint Publication of the Northern Virginia and Washington Sections

SCANNER

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Calendar of Events

Attendance at IEEE Meetings. IEEE meetings are open to members and guests. When meetings are combined with meal functions, it is not mandatory—though desirable—to attend the meal functions. Please make timely reservations for all meetings, where required; cancel early, if necessary. Any IEEE member may attend Council and Section Administrative Committee (ADCOM) meetings.

Announcements. Calendar information should follow the format used in this Calendar of Events. The calendar item listing includes the abbreviation of the managing section after each society chapter listing. In the case of joint chapters, the managing section is listed first. A diamond (♦) preceding the event in a calendar item indicates that further information on that event is provided in the

"Diamond Stories" Department of that issue, which follows the Calendar of Events. Articles for the Diamond Stories should be limited to 200 words; they should include a synopsis of the talk or event, and a biosketch of the speaker(s), which lists, if available, academic background, current position, and IEEE as well as other professional societies membership(s), if any.

All announcements, diamond stories, and other material to be printed in an issue of the SCANNER must be sent, faxed, or e-mailed to the Editor-in-Chief in time to arrive on or before the 25th of the second month preceding the month of desired publication. The deadline for camera-ready material (e.g., ads) is the first workday of the month preceding the month of desired publication.

Tue Dec 3	NCAC ADCOM/EXCOM Meeting with Northern Virginia Section	4693, or 301/924-2610 by noon Dec 3; For latest details on program, see http://www.access.digex.net/~rboucher/ieee
Place:	Tyson's Corner Marriott, J.W. Restaurant, Tyson's Corner, VA; Take Route 495 to Route 7 West to 8028 Leesburg Pike; on the right side, just outside the Beltway	
Time:	Dinner 6:00 pm to 8:00, followed by Northern Virginia Section Meeting	
Contact:	Call NCAC Office, 703/803-8701, Jackie Hunter	
Tue Dec 3	Networking/Business Meeting/TBA	
Sponsor:	NCAC Consultants Network (W/NV)	
Place:	Dinner: Sir Walter Raleigh Restaurant, Falls Church, VA; Meeting: Virginia Tech @ Falls Church, I-495 to Rte 50 West; 1st exit to Gallows Road/Rte 650; 2nd light onto Gatehouse Road. Restaurant is on left. VA Tech is down the road, 1st left onto Telstar Ct.	
Time:	Dinner 5:30 pm; Meeting 8:00	
Contact:	For further details and/or reservations, call 301/460-	
Wed Dec 4	♦ Metabayesian Statistical Analysis—Empirical Distribution Use	
Sponsor:	Reliability Society (W/NV)	
Speaker:	Palmer Luetjen	
Place:	Vitro Corporation, 13900 Connecticut Ave (Entrance on Aspen Hill Road)	
Time:	Pre-Meeting Dinner at Anchor Inn, Georgia Ave and University Blvd, 6:00 pm; Meeting 8:00	
Contact:	Call Ron Combs, 703/553-1733, or Harry Ascher, 301/762-4779, even if you are only attending the meeting	

IEEE National Capital Area Council SCANNER is published six (6) times a year: bi-monthly Feb/Mar, Apr/May, Oct/Nov, Dec/Jan; monthly in Sep, and tri-monthly Jun/Jul/Aug by The Institute of Electrical and Electronics Engineers, Inc. Headquarters: 345 East 47th Street, New York, NY 10017. Sent automatically at a cost of \$1.00 per member per year (included in annual dues) to each member of the Washington and Northern Virginia Sections. Second class postage paid at New York, NY and at additional mailing offices. Postmaster: Send address changes to IEEE National Capital Area Council, SCANNER, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331. (ISSN 0894-0452)

Tue Dec 10	♦ Millimeter-Wave Commercial Opportunities and Required Technology	Tue Jan 7	NCAC ADCOM/EXCOM Meeting with Washington Section
Sponsor:	Microwave Theory and Techniques Society (W/NV)	Place:	Pooks Hill Marriott, Allee's Pantry Restaurant, Bethesda Marriott Hotel
Speaker:	Dr. Lamberto Raffaelli, ARCOM, Inc	Time:	Dinner 7:00 pm; Meeting until 8:00, followed by Washington Section Meeting
Place:	U of MD Adult Education Center, University Blvd and Adelphi Road, Adelphi, MD	Contact:	Jackie Hunter, NCAC Admin Office, 703/803-8701
Time:	Cocktails 5:30 pm; Meal 6:30; Meeting 7:30	Tue Jan 7	Data Bases for Consulting Marketing
Contact:	Info and dinner reservations (by Dec 4) 301/286-3216, or e-mail: ronald.j.hooker.1@gsfc.nasa.gov	Sponsor:	NCAC Consultants' Network (W/NV) (For further details see "Consultants" entry for Dec 3)
Thu Dec 12	♦ ICO Mobile Satellite System and Planet 1	Tue Jan 14	♦ Spread Spectrum Technology and its Application to Wireless Local Area Networks
Sponsor:	Communications Society (W/NV)	Sponsor:	Microwave Theory and Techniques Society (W/NV)
Speaker:	Dan Swearingen, Vice President, Advanced Engineering and Planning, COMSAT	Speaker:	Jim Shea, SIGTEK, Inc., Columbia, MD
Place:	George Washington University Academic Center, 22nd & I Street, NW, Room T-640, EE Dept, one block from Foggy Bottom Metro Station. Parking across from Academic Center	Place:	Univ of Maryland Adult Education Center, University Blvd & Adelphi Road, Adelphi, MD
Time:	Brown bag lunch (bring your own) 11:45 am; Registration 12:00 noon; Presentation 12:15 pm to 1:00	Time:	Cocktails 5:30 pm; meal 6:30; Meeting 7:30
Contact:	Don Rickerson, 202/651-3912	Contact:	Info and dinner reservations (by Jan 8), call 301/286-3216, or e-mail ronald.j.hooker.1@gsfc.nasa.gov
Fri Dec 13	Lessons Learned from a Medieval Map: The Vinland Map	Tue Jan 21	♦ Small Business Teaming for Government Contracts
Sponsor:	The Philosophical Society of Washington; non-members welcome	Sponsor:	NCAC Consultants' Network (W/NV) For further details see "Consultants" entry for Dec 17 and ♦ story
Speaker:	Jacqueline Olin, research associate, Conservation Analytical Laboratory, Smithsonian Institution	Wed Jan 22	♦ Overview and Perspectives on Japanese Manufacturing Strategies, Emerging Manufacturing Technologies, Production Practices, and Education System
Place:	John Wesley Powell Auditorium, Cosmos Club, 2170 Florida Ave NW, Washington, DC	Sponsor:	Reliability Society (W/NV)
Time:	8:15 pm	Speaker:	Dr. Jay Lee, Program Director, National Science Foundation
Contact:	Eloise Moore Agger, Program Chair, 301/652-7325	Place:	Vitro Corporation, 13900 Connecticut Ave (Entrance on Aspen Hill Road).
Tue Dec 17	Comstor/Cisco Presentation: Strategic Business Opportunities with Comstor/Cisco Value Added Services	Time:	Premeeting Dinner at Anchor Inn, Georgia Avenue and University Blvd 6:00 pm; Meeting 8:00
Sponsor:	NCAC Consultants Network (W/NV)	Contact:	Ron Combs, 703/553-1733, or Harry Ascher, 301/762-4779, even if you are only attending the meeting.
Place:	Dinner: Seven Seas Restaurant (Rt.1, College Park, MD); Meeting: U of MD, College Park Campus, AV Williams Eng Bldg, Room 2460; Rt 1 South from I-495. Right onto Campus Drive and immediate right onto Stadium Drive; 1-1/2 blocks to Eng Bldg on right. Park on left in Lot G		
Time:	Dinner 5:30 pm; Meeting 7:30		
Contact:	301/460-2610 by noon Dec 17; for details on program, see http://www.access.digex.net/~boucher/ieee		

JANUARY 1997

Fri Jan 3	Retiring President's Address
Sponsor:	The Philosophical Society of Washington
Speaker:	Dr. Joseph Coates, President, The Philosophical Society of America
Place:	John Wesley Powell Auditorium, Cosmos Club, 2170 Florida Ave NW, Washington, DC
Contact:	Dr. Joseph Coates, 202/966-9307

FEBRUARY 1997

Tue Feb 11	Overview of GLOBALSTAR Mobile Satellite System
Sponsor:	Microwave Theory and Techniques Society (W/NV)
Speaker:	Jerry Hoot, Lockheed-Martin, MD
Place:	Univ of MD Adult Education Center, University Blvd & Adelphi Road, Adelphi, MD
Time:	Cocktails 5:30 pm; Meal 6:30; Meeting 7:30
Contact:	For info and dinner reservations (by Feb 5), call 301/286-3216 by Feb 5, or e-mail ronald.j.hooker.1@gsfc.nasa.gov

◆ DIAMOND STORIES ◆

[This Department of the SCANNER provides short abstracts and biosketches to accompany those calendar items which show a diamond (◆) before the name of the Subject or Event]

Metabayesian Statistical Analysis—Empirical Distribution Use

(See Calendar of Events, Wednesday, December 4)

This method, the use of the empirical distribution, has all the rigor of the classical Bayesian analysis plus the ease of the classical Frequentist analysis, giving the added feature of estimating the entire parent population distribution instead of only the mean and its error distribution.

An example will be given of a parent population of five members (N=5 in this case, but in general N could be anywhere from 1 onward). A sample will be drawn of ten items with replacement, that is after each item selected, the value will be recorded and the item returned to the population. This is the Empirical sampling distribution.

A second sampling distribution, the Error distribution, will be obtained by drawing a sample of two items. The values of the two are averaged, and this mean is one data point. Three data points are obtained this way, and they make up the Error distribution values. Then the Empirical and Error distribution parameters are compared with the parent population parameters.

Mr. Palmer Luetjen is a consultant in Reliability and Statistics. He graduated from Clemson and the George Washington Universities.

Millimeter-Wave Commercial Opportunities and Required Technology

(See Calendar of Events, Tuesday, December 10)

The millimeter-wave (MMW) commercial market is offering unprecedented opportunities to the microwave component industry. Point-to-point digital radios, automotive sensors, and wireless TV represent key applications that could bring the MMW market to volumes similar to their low-frequency counterparts. This presentation will describe the applications and the required microwave technology.

Dr. Lamberto Raffaelli is the founder of ARCOM, Inc., Salem, NY. He designs and manufactures MMW wireless products for digital radios and other applications. Earlier he worked at Alpha Industries, Teledyne MEC, Elettronica, and the University of Bologna, where he graduated in 1975. He has been a member of the IEEE since 1986.

This is the third lecture in the MTT-S course on future wireless systems and technologies. All interested parties are welcome to attend.

ICO Mobile Satellite System and Planet 1

(See Calendar of Events, Tuesday, Dec 12)

ICO is an international enterprise created to provide global mobile personal communications by satellite (GMPCS) that was born out of an Inmarsat initiative as "Project 21."

The ICO satellite system is designed to support a full complement of PCS services to handheld mobile phones including telephony, fax, paging, and data. The ICO system consists of 10 operational satellites (in two intermediate-altitude 6-hour circular orbits) working in conjunction with 12 satellite access nodes that are interconnected with each other and the PSTN. The first ICO satellite is scheduled for late 1998 launch, and the system is to be fully operational by early 2000.

An early form of GMPCS is available already with the advent of the newest portable Inmarsat mobile terminal standard called "Inmarsat Mini-M." Although not small enough to be labeled "hand-held," the terminal being offered by COMSAT as part of its "Planet 1" program is only as big as a small notebook and supports personal mobility via SIM smart-card technology.

Dan Swearingen is the Vice President for Advanced Engineering & Planning at COMSAT Personal Communications. His work in mobile satellite communications included design contributions to the MARISAT System, the Inmarsat System, and the ICO system. An IEEE Senior Member, he holds a BSEE degree from Georgia Tech, and a MSEE degree from Stanford.

If you have any questions, please fax them to Dan at 301/214-7237.

Spread-Spectrum Technology and its Application to Wireless Local Area Networks

(See Calendar of Events, Tuesday, Jan 14)

Spread spectrum communications technology has been transformed from a high-cost military technology to a robust low-cost solution for wireless local area networks. The FCC has allowed unlicensed operation in the ISM band at 2.4 GHz. The IEEE 802.11 standard seeks to assure coexistence of systems and provides specifications for direct sequence and frequency hopping systems. The strengths and weaknesses of these technologies for wireless LAN, medical telemetry, and digital video transmission will be explored and compared.

Mr. Jim Shea, an IEEE member since 1986, is president and founder of SIGTEK, Inc. in Columbia, MD, which specializes in digital communications systems ranging from T1 spread spectrum links to programmable TDMA/SCPC satellite systems. Earlier, Mr. Shea worked for ARGO Systems and the DoD. He received the BSEE from Georgia Tech, and the MSEE from the University of Illinois in 1983. This lecture is the fourth lecture in the Future RF/Microwave Wireless Systems & Technologies course sponsored by the WNWV MTT-S. All interested parties are welcome to attend.

Small Business Teaming for Government Contracts

(See Calendar of Events, Tuesday, Jan 21)

Systems Engineering and Technical Assistance (SETA), Business Process Reengineering (BPR), software and hardware engineering, and other Consulting, Advisory and Assistance types of contracts are low-capital-knowledge-intensive types of work. The Government awards these types of contracts for up to \$100 million under the terms of full and open competition to large business prime contractors. Now, many Small, and Small Disadvantaged Businesses (SDBs), perform the same type of activities as the large contractors. These SDBs could form strategic alliances and compete for these low-capital, knowledge-intensive awards against the large contractors in response to government requests for proposals. However, these strategic alliances are not being formed at this time, so the questions is: why aren't they teaming?

This research explored the perception of the issues precluding the formation of such strategic alliances by 24 population subsets within the Small and SDB community, identified and researched 28 barriers, and recommended ways to mitigate the two major barriers.

RE '97

Third IEEE Int'l Symposium on Requirements Engineering

Annapolis, Maryland, USA

January 6-10, 1997

Preliminary Program

The Third IEEE International Symposium on Requirements Engineering (RE '97) provides a forum for researchers and practitioners to discuss requirements engineering, the branch of software engineering concerned with methods, techniques, and tools for eliciting, specifying, and analyzing software requirements. Featured this year is an industrial program consisting of industry experience reports, a panel on the requirements problem in industry, 5 tutorials, and a tools exhibit. The symposium also features 21 research papers, a minitutorial, 2 workshops, a panel on change, and a doctoral consortium. The symposium site is historic downtown Annapolis, 30 miles east of Washington, D.C.

SCHEDULE

Monday (Jan. 6): Doctoral Consortium; Monday, Tuesday (Jan. 6-7): Tutorials; Wednesday, Thursday, Friday (Jan. 8-10): Technical Program

Keynote Speakers

Anthony Hall (Praxis) "What's the Use of Requirements Engineering?"

Many approaches to requirements engineering exist but often conflict. Conflicts can best be resolved by asking: "What is the use of doing that?". How addressing this question helps in choosing requirements methods and in dealing with difficulties that arise in applying the methods is discussed. Dr. Hall, a principal consultant with the software engineering company Praxis, pioneered the use of formal specification in industrial projects and led the design of the CDIS air traffic information system, one of the largest industrial applications of formal methods. He has worked on requirements for many systems and guided the development of major systems from requirements.

Colin Potts (Georgia Inst. Tech.) "Requirements Models in Context"

Traditional requirements engineering stresses generalization and abstraction. But, by abstracting away from the context, the designer may model only those things that are easy to model and ignore the subtleties, special cases, and concrete features of the context. In contrast, approaches that stress context at the expense of abstraction may lead to floundering or to short-term customer satisfaction at the expense of long-term system fragility. Needed is a synthesis of the two approaches. Professor Potts, a member of Georgia Tech's Software Research Ctr. and its Graphics, Visualization and Usability Ctr., has held positions in both industrial R&D and software development.

John Rushby (SRI International) "Calculating with Requirements"

Formal techniques, such as strong type checking and completeness and consistency checking using decision procedures and model checking, reduce certain questions about requirements to automated (and therefore fast, cheap, and repeatable) calculations. Examples from space shuttle and other applications illustrate the techniques. Dr. Rushby, Program Director of SRI's Computer Science Lab., develops formal verification systems (the latest is PVS) and applies them to problems in computer security, hardware design, and safety-critical and fault-tolerant systems. PVS is currently being used in industrial projects applying formal methods to aerospace problems.

David Harel (Weizmann Institute of Science) "Will I Be Pretty, Will I Be Rich? Theory vs. Practice in Systems Engineering"

What is the role of theoretical vs. applied research in the specification and design of reactive, highly concurrent systems? This talk classifies the research performed by theoreticians into three kinds of theory—theory for the sake of theory, theory of foundations and principles, and theory arising from applications. The different kinds of theory are illustrated with examples from several areas of computer science. Professor Harel is the William Sussman Professor of Mathematics at the Weizmann Institute. A cofounder and chief scientist of i-Logix, Inc., he is also the inventor of the statecharts language and was part of the team that designed the StateMate system. His most recent book is "Algorithmics: The Spirit of Computing" (MacMillan 1988).

Minitutorial

Model Checking and Requirements - Daniel Jackson (Carnegie Mellon University). With its dramatic success in automatically detecting design errors (mainly in hardware and protocols), model checking has recently rescued the reputation of formal methods. This tutorial describes what model checking is, what tools have been developed, and how the tools might be used to analyze requirements. It also introduces *model enumeration*, a new technique that, unlike model checking, allows structures, rather than event sequences, to be analyzed automatically.

Panels

Impact of Environmental Evolution on Requirements Changes - Chair: Nazim Madhavji (McGill University). When a system is being developed, the system's environment usually keeps evolving. This environmental evolution may adversely affect the system implementation, causing functional deficiencies, performance problems, etc. To avoid such problems, the effects of environmental changes on system requirements must be identified. This panel will discuss the impact of environmental change on requirements and how this problem can be understood and solved.

Industrial Priorities for Requirements Engineering Research - Chair: Steve Miller (Rockwell-Collins). Solutions to problems studied by the RE research community often do not meet the real needs of industry. Industry representatives will provide insight into the most critical problems that research should be attacking.

Tutorials

Making Requirements Measurable — Bashar Nuseibeh (Imperial College) and Suzanne Robertson (Atlantic Systems) Participants in this full-day "interactive" tutorial examine measurability by building a requirements specification for a familiar system. A requirements template is used as a guide. How measurable requirements can be used to build a requirements quality filter is described.

Requirements Specification and Analysis With SCR — Stuart Faulk (University of Oregon) and Connie Heitmeyer (Naval Research Laboratory). This half-day tutorial describes the practical, industrial-strength Software Cost Reduction (SCR) method for developing requirements. The formal model that underlies SCR and software tools supporting consistency checking, simulation, and verification are described. The application of SCR to two practical systems is discussed.

Software Requirements Specification and System Safety — Mats Heimdahl (University of Minnesota) and Jon Reese (University of Washington). After introducing system safety, this half-day tutorial discusses how software control affects safety analysis and outlines the root causes of safety problems. The formal language RSML (Requirements State Machine Language) is introduced. RSML has been used to capture the requirements of several safety-critical systems, most notably TCAS II.

Requirements Traceability — Anthony Finkelstein (City University, London) and Richard Stevens (QSS). This half-day tutorial focuses on requirements traceability, the ability to describe and follow information about the life of a requirement. The focus will be on traceability in a systems engineering setting. The tutorial will provide a detailed look at requirements traceability and practical techniques for supporting it.

Object-Oriented Requirements Specification — Roel Wieringa (Free University, The Netherlands). This half-day tutorial presents the latest object-oriented requirements methods and compares them to recent developments in structured analysis. Four methods are covered: the Unified Modeling Language of Rumbaugh, Booch and Jacobson; Fusion (1996) extended with use cases; OOA (Shlaer-Mellor); and Yourdon Systems Method (1993). The potential for combining different methods is discussed.

Workshops

Scenario-Based RE Methods. While scenarios have become an important component of requirements engineering, little guidance exists on how scenarios may be used in validation, requirements elicitation, etc. This workshop explores the different concepts of scenarios and whether a common view of scenarios exists. Means of technology transfer and research challenges will be discussed. (Organized by Alistair Sutcliffe, City University, London)

Software on Demand: Issues for RE. Software on demand is software that can be delivered over the Internet on an as-needed basis. The user can download full applications or small plug-ins to complete the current task at hand. This workshop will explore topics such as how to specify the requirements of software on demand and how software on the net can be organized. A prototype software on demand system will be used as a strawman. (Organized by Steve Fickas, University of Oregon)

Tools Exhibit

Chairs: Charles Payne, Dwight Colby (Secure Computing Corp.). Presentations and demos of state-of-the-art commercial tools along with cutting edge academic efforts are scheduled. Confirmed exhibitors include Vitech Corp. (CORE), Marconi Systems Technology, Inc. (RTM), QSS (DOORS), TD Technology (SLATE), Universite' Catholique de Louvain (GRAIL/KAOS), and Naval Research Lab (SCR Toolset).


Doctoral Consortium

Chair: Myla Archer (Naval Research Lab). One of the most popular events of RE '95, the Doctoral Consortium gives students whose doctoral research is not yet complete an opportunity to present their work to colleagues in RE.

Organizing Committee

General Chair: Connie Heitmeyer (Naval Research Lab) heitmeyer@itd.nrl.navy.mil
Program Chair: John Mylopoulos (University of Toronto) jm@cs.toronto.edu
Industrial Chair: Stuart Faulk (University of Oregon) faulk@cs.uoregon.edu

More information and registration materials:

<http://www.itd.nrl.navy.mil/conf/ISRE97>  50 YEARS OF SERVICE • 1946-1996

Overview and Perspectives on Japanese Manufacturing Strategies, Emerging Manufacturing Technologies, Production Practices, and Education System

(See Calendar of Events, Wednesday, Jan 22)

The presentation gives an overview of Dr. Jay Lee's research findings on the study of current manufacturing strategies, emerging technologies, and production practices in three major industries in Japan, namely, the machine tools industry, the semiconductor industry, and the automotive industry.

The study of Japanese manufacturing strategies and production practices was part of Dr. Lee's research assignment (from June to December 1995) at the Mechanical Engineering Lab (MEL) of the Ministry of International Trade and Industry (MITI) in Tsukuba. During this period he visited 33 companies and 12 universities. This presentation summarizes his findings about the technological status in Japanese manufacturing industries, research and education activities in Japanese universities, and major initiatives in Japanese government. In addition, possible collaboration on manufacturing research and education will be discussed.

Japan has been the world leader in manufacturing in the past several decades. In less than 50 years since the end of World War II, Japan has transformed itself from a defeated nation with a devastated economy to an economic superpower. Undoubtedly, this leadership will persist well into the 21st century. It is, therefore, very important to understand the status of the Japanese manufacturing technologies as well as its projected manufacturing strategies for the future, especially those technologies which would generate substantial impact on manufacturing industries in the next five years.

Dr. Jay Lee is Program Director of the Engineering and Education and Centers Division as well as the Design, Manufacture and Industrial Division of the National Science Foundation (NSF). Prior to joining NSF, he held several engineering and management positions at Fenn Manufacturing Co., AMCA International, Robotics Vision System, Inc., and the Office of Advanced Technology of the US Postal Services HQ. He has been involved in research and engineering activities in the areas of robotics, machine vision, neural networks, and manufacturing policy.

He is an adjunct professor at Johns Hopkins University's Applied Physics Lab. He holds three U.S. patents, has over fifty publications, and authored two books. He has delivered technical speeches in the U.S., Germany, Japan, Singapore, Korea, Taiwan, and China.

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CHAIRMAN'S CORNER

National Capital Area Council Chairman's Message

The NCAC Officers continued to make progress through the fall months serving the interests of Washington Area IEEE members with local programs supporting continuing education, technical conferences, and job opportunity fairs. These activities have served hundreds of IEEE members throughout the region. As a part of the IEEE's professional development program, the members who take part in these activities become aware of new skills to help them stay competitive in the work force, and learn how to survive in an ever-changing work environment.

The NCAC officers have joined forces in working with other engineering organizations, such as the American Association of Engineering Societies (AAES), the DC Council of Engineering and Architectural Societies (DCCEAS), the Maryland Council of Engineers Society (MCES), as well as the Washington Academy of Science (WAS). These associations are but a few of the many inter-society fellowships where the IEEE has continued to demonstrate its role as a leader among technical professional organizations. The NCAC continues to plan support for engineering activities with the associations, such as the National Engineers Week program in February, and the local DC and State policy board issues on engineering professionalism, continuing education, and certification.

The NCAC is continuing its support of IEEE conferences in the Washington metropolitan area. Many IEEE societies hold conferences here in the Washington area throughout the year, but this year the number of conferences is particularly high because of the nation-wide interest in an election year. These past months many such conferences were held here, including the COMPASS'96 Conference, the Power Engineering Conference, the MILCOM Conference, and the Consultants' Networks Conference. Joint conferences with associated societies are scheduled in the winter and spring, such as the COMNET conference. See the adds in the SCANNER for details.

NCAC and section officers are continuing their support of student branch programs at colleges and universities in Northern Virginia and Washington DC. There are seven (7) active branches in the Washington metropolitan area, including George Washington University, George Mason University, Capitol College, Catholic University, University of the District of Columbia, Howard University, and University of Maryland. Each has a faculty advisor/coordinator. The NCAC officers work with the advisors and faculty to offer lectures and provide mentoring on professionalism and IEEE issues.

Again, the NCAC officers salute those who have made an outstanding contribution to support this effort. Without them these programs would not be possible, and the members would not receive the benefits of professional development. We invite you to keep making a difference and continue your support.

Jerry Gibbon

Chairman, National Capital Area Council

Washington Section Chairman's Message

As this issue of the SCANNER is mailed, the national presidential elections will be over, and the IEEE presidential elections will also be a matter of history. I trust that you exercised your rights and voted in both sets of elections (and hopefully the candidates of your choice won!)

If you haven't already done so by now, it is time to renew your IEEE membership for 1997. The 37 IEEE technical societies continue

to issue many high-quality publications in more specific subject areas each year. There are several new publications available this year, not only to members of the specific technical society, but to all interested members.

Lastly, I would like to encourage you to attend local meetings of our IEEE chapters, and other events sponsored or co-sponsored by the IEEE in the Washington area. Think about attending a meeting in an area outside of your technical specialty—you may be pleasantly surprised by what you learn, and you may make some new friends!

I would like to wish you all a safe and happy holiday season, and all the best in 1997.

Ronald Aasen

Chairman, Washington Section



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EDITOR'S CORNER

Changing of the Guard

After about a decade of association with the SCANNER Newsletter and its predecessor, the Washington Section Bulletin, it is time for me to step aside. Your new Editor-in-Chief will be Ernie Freeman: a good friend of mine, an IEEE Fellow with an outstanding record in the IEEE as well as in his business, "Sachs, Freeman Associates." He has formally retired, but still maintains an office there. His telephone number is 301/925-9471. More information on this "changing of the guard" will be provided in the next "Letter to all Officers."

SCANNER Goes on Worldwide Web

The "Letters to the Editor" column in the April/May 1996 SCANNER contained the following entry: "SCANNER on the World Wide Web?" George Hagn made this suggestion after reading Al Reiner's letter in the prior issue regarding the SCANNER being a useful forum for local IEEE members to express their views on controversial issues that could affect all members. An on-line SCANNER would not be severely page limited, and the NCAC eventually could save a lot on printing and mailing costs as members convert over to receiving their SCANNER electronically. Also, an electronic version has the potential for disseminating program change information after the printed version has been mailed. Christopher M. Griffin, a student at the University of Maryland wrote a letter to the editor (see Jun-Jul-Aug '96 issue) offering to help.

George Hagn and your editor drafted a home page for the NCAC which was discussed at the Region 2 South Area Officers Training Workshop at Capitol College on 1 June 1996 by Jim Strother. There was general agreement among the attendees and an ad hoc NCAC Home Page Committee that we should proceed. The result is a draft NCAC home page that includes the on-line version of the SCANNER, and home pages for the Washington and Northern Virginia Sections as well as for the IEEE student chapters in the Washington, DC area. This draft home page (in draft until the Feb/Mar 1997 issue) can be accessed from the following WWW Universal Resources Location (URL): <http://www.coun.ncac@ieee.org>, as well as from the main IEEE Home Page <http://www.ieee.org>. Major headings of the draft NCAC Home Page are given below:

WWW Home Page for the IEEE National Capital Area Council (NCAC)

"The National Capital Area Council (NCAC) of the Institute of Electrical and Electronics Engineers (IEEE) is comprised of two sections of the IEEE: the *Washington Section* and the *Northern Virginia Section*. These sections each have their own World-Wide WWW Home Pages.

This NCAC Home Page provides the on-line version of the IEEE NCAC SCANNER Newsletter, which provides the *calendar* of events for the current month and the next month. Other features of the NCAC home page include the following information on the NCAC and its activities:

- Geographic Coverage) of the NCAC
- Preamble of Bylaws
- Organization and Administration
- Functions Delegated to NCAC
- Funding
- Committees in NCAC Area
- IEEE Membership Forms

- Professional Opportunities
- Awards
- Advertisers
- Frequently Asked Questions (FAQ)
- Web Site Policies

Comments and suggestions are appreciated by the NCAC Home Page Committee. (E-mail to Hagn@erg.sri.com).

• • • • •

As a swan song of my service as your editor, I would like to reprint a poem that first appeared in the report of the Washington Section's evening meeting of January 26, 1916, and which I reprinted in a previous SCANNER.

Here is a toast that we want to drink to a fellow we'll never know. The fellow who's going to take our place when it's time for us to go.

We wonder what kind of a chap he'll be, and we wish we could take his hand,

Just to whisper: We wish you well, old man, in a way that he'd understand.

We'd like to give him the cheering word that we've longed at times to hear;

We would like to give him a warm handclasp when never a friend seems near.

We've gained our knowledge by sheer hard work, and we wish we could pass it on

To the fellow who'll come to take our place some day when we are gone.

As we get too involved in our daily routine in a competitive world, let us remember that the holiday season is upon us—a celebration with our loved ones. A Dr. Sidney Adler came up with an excellent recipe for all of us:

Hugging—One of Life's Essentials!

A Recipe for a Perfect Hug:

Two people, four arms, two hearts, a touch of love; a pinch of humor, and a sprinkle of glee.

Directions: Extend arms and wrap them around each other. Clear your minds, take a good look at each other, then pull yourself together and mix well. Serves two.

Hugging is practically perfect. It has no movable parts, no batteries to wear out, no periodic checkups, no monthly payments, and no insurance requirements. It has a low energy consumption and yet a high energy yield.

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YOUR LOCAL REPORTER

New Internet Initiatives Announced

In an October 10 speech in Knoxville, President Bill Clinton announced a series of initiatives to promote the Internet and its use in research and education. The centerpiece was Clinton's announcement that he would reprogram \$100 million in FY 1998 federal funding to support the first stage of a "Next Generation Internet Initiative." The stated goals of the Internet Initiative are:

1. Connect at least 100 universities and national labs with high-speed networks that are 100 - 1000 times faster than today's Internet.
2. Promote experimentation with the next generation of networking technologies.
3. Demonstrate new applications that meet important national goals and missions such as scientific research, national security, distance education, environmental monitoring, and health care.

Technical details are not yet available and the Administration has stated that it "intends to consult broadly with the research community, the private sector, and other stakeholders before developing the final technical details for this initiative." The Administration described the envisioned capabilities as "an increased ability to handle real-time multimedia applications, ... sufficient bandwidth to transfer and manipulate huge volumes of data, ... the ability to access remote supercomputers, ... and the ability to collaborate with other scientists and engineers in shared, virtual environments, including reliable and secure remote use of scientific facilities."

The Initiative will be financed through the federal High Performance Computing and Communications program. The National Science Foundation and the Departments of Energy, Commerce, and Education are slated to contribute \$30 million, with the remaining \$70 million coming from the defense budget. No funding commitments beyond FY 1998 will be made until the program is evaluated. The President's Science and Technology Council has estimated that development of a next-generation Internet will cost between \$350 million and \$650 million, and will take between five and six years to implement.

Cautious of having the Initiative labeled as "industrial policy," Administration spokespersons emphasized that the effort is focused on developing new high speed networks for government and university research that the private sector is unlikely to support on its own. They reaffirmed that the private sector will continue to be responsible for construction, ownership, and operation of the Internet.

President Clinton also proposed on October 10 that every school and library in the U.S. be provided with free access to basic Internet services. The Telecommunications Reform Act of 1996 as passed by Congress contained provisions shifting the focus for use of universal access funds from rural and low-income groups to providing discounted rates to schools and libraries. Consistent with this process, the Administration has submitted a formal comment to a joint federal-state board responsible for determining how the revamped universal access subsidy fund will be administered. Clinton is essentially asking the Federal Communications Commission to approve a so-called E (or education) rate financed through the universal access subsidy that would allow every school and library to hook up to the Internet and have a minimum level of service so that they would be able to use on-line services without prohibitively expensive long distance charges. Schools and libraries would have to determine whatever additional telecommunications services they want, and fund them through other sources.

IEEE-USA has posted an issue brief on the Internet Initiatives with copies of the Clinton speeches, an Administration whitepaper, and

a related press conference with senior administration officials on the World Wide Web which can be accessed at <http://www.ieee.org/usab/DOCUMENTS/FORUM/ISSUES/internet.html>.

Best Practices Survey

Dear Volunteer:

The Section Chapter Support Committee has been charged with the responsibility for collecting and publishing some of IEEE Sections' "best practices"—new, interesting, innovative, low-cost programs, products and services that benefit the section itself and/or its members. The concept is that if these good ideas are collected and compiled, other sections can benefit from your experiences and replicate your programs or services.

We would like you to outline your program, providing the information requested below. Please be sure to think broadly and include best practices associated with or undertaken by your chapters and student branches. Then, send your "best practices" to:

Best Practices, Section Chapter Support, IEEE, Inc.
445 Hoes Lane, PO Box 1331 Piscataway, NJ 08855-1331,
or Fax to 1-908-463-9359, Attn: Section Chapter Support,
or e-mail to sec.chap.support@ieee.org

Please make sure your submission includes:

- Name of the project, product, service
- Brief description
- Date project initiated
- One-time program?, or on-going?
- Benefits to section/members (e.g., improved image, new members, revenue, etc.)
- Contact (name and contact information for details of program)

Thank you for your input and help. Your fellow section leaders and the IEEE in general will benefit from your generosity.

Sincerely,

David G. Green, Chairman, RAB Section Chapter Support Committee

Jill Berman Levy, Director, IEEE Regional Activities Operations, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, tel 908/562-5514; Fax: 908/463-9359; e-mail: j.levy@ieee.org

Virtual Immigration/Net Censorship?

Does the outsourcing of engineering work have an impact on the employment of U.S. engineers? Is outsourcing already affecting employment? If so, how? What actions should IEEE U.S. Activities take to address outsourcing? These are questions posed to U.S. Institute members in this month's edition of "IEEE-USA PERSPECTIVES' Web Extra" available on the Internet at www.ieee.org/usab. Members are encouraged to respond to the survey via e-mail through g.stelluto@ieee.org.

The current PERSPECTIVES' Web Extra*, overseen by volunteer editor-in-chief Jean M. Eason, also includes a member's response to last month's "Surfer Survey" on whether technology should be used to give adults the ability to block objectionable content on the Internet. In addition, the September "Web Extra" includes a reprint from The New York Times on a recent Supreme Court case in which the justices ruled that age bias can occur "even when one "over-40" worker replaces another." Finally, the current PERSPECTIVES' supplement includes the regular "IEEE-USA News Bytes"

feature which highlights the latest career and technology policy developments in the nation's capital. The October "Extra" will seek member opinions on IEEE-USA projects.

New Survey Shows Electrical Engineering Salaries Slightly Up, Unemployment Down

Income for electrical, electronics and computer engineers increased 5.9 percent during the past two years, outpacing the rate of inflation.

Those working in their primary specialty in 1995 had total incomes averaging \$71,900, according to a biennial survey of U.S. members conducted by the U.S. Activities division of the IEEE. Two years ago, average income was \$67,900. Between 1993 and 1995, the consumer price index rose 5.6 percent. Highest incomes were recorded in the Northeast; the lowest in the Midwest.

According to Robert S. Duggan, Jr., chairman of the IEEE-USA Survey Committee: "After the major economic disruptions of the past several years, the results of this survey should prove encouraging to the beleaguered engineering workforce. We find that the income pie is getting a little bit larger, and there are also more slices to go around."

The IEEE-USA survey shows more retired electrical engineers and fewer EEs working full-time. Part-time employment registered 4 percent, and retirement accounted for 15.4 percent of respondents. Nearly 70 percent were employed full-time in their primary specialty, and another 7.5 percent were working full time outside their fields. Among the remaining, 2.3 percent were involuntarily unemployed, down from a record high of 2.7 percent in 1993.

The poll provides extensive statistical data regarding engineering income by industry sector. The highest median incomes were reported by engineers in communications (\$70,138), computers

(69,929), and aerospace (\$69,500), while the lowest were reported in the automotive industry (\$62,000) and transportation (\$60,000). By job function, engineers in general management have the highest income, those in manufacturing and production the lowest.

A minority of respondents, 20.1 percent, are registered professional engineers. Another 13.3 percent qualify for Engineer-in-Training status. The most commonly held degrees are the Bachelor of Science in electrical engineering, or in electrical and computer engineering.

Almost all (94.9 percent) respondents were men, and 88.2 percent identified themselves as non-Hispanic white. Asian-Americans represented the largest minority group with 7.6 percent.

Electrical Engineers Would Save More With Expanded IRAs

According to a poll conducted by IEEE-USA, electrical engineers would increase their personal retirement-savings rates if Congress enacts pending savings-incentive legislation. "The poll reveals an overwhelming consensus that engineers will do their part to rebuild the collapsing national savings rate—if Congress gives them the tools," stated IEEE-USA Board Chair Joel P. Snyder, "Engineers are telling us that they're worried about retirement security, but they simply can't afford to increase their savings and their tax bite at the same time," he said.

The poll results come as Congress considers ways to encourage personal savings. The American Dream Restoration Act, passed by the House as part of the "Contract with America" Tax Relief Act, permits individuals to make taxable contributions of up to \$2,000 a year to new "American Dream Savings Accounts" (ADSAs) irre-

spective of income or pension-plan participation. The distributions from these accounts would not be subject to additional tax or penalty if used for retirement, a first-time home, educational expenses or major medical costs. The Individual Retirement Account (IRA) Equity Act, also passed by the House, raises the dollar amount that a non-working spouse can contribute to a conventional tax-deductible IRA from \$250 to \$2,000.

Critics of the current proposals claim that tax incentives to use savings instruments would lead Americans merely to redistribute their investments, not actually increase their savings. "Our survey data suggest that new savings incentives will result in more investment—increased savings to ensure Americans' retirement security, and

more private capital to boost U.S. economic competitiveness," said James. V. Leonard, chair of IEEE-USA's Engineering Employment Benefits Committee. "As members of the nation's second-largest profession—and a major portion of its middle-class savers—electrical engineers are a bellwether on this issue," he added...

The survey group was virtually united in its commitment to save more with additional tax incentives. Of those reporting they would participate in the new plans, nearly four of five said their contributions would constitute an increase in their overall level of savings. Only 22 percent indicated they would merely shift their investments to gain the tax advantages.

PACE CORNER

[This Department provides information on the activities of the Sections' or Council's "Professional Activities for Engineers" (PACE) Committees]

Careers—or a Commodity? (*)

This article gives extracts from a paper prepared by Paul J. Kostek, Region 6 PACE Coordinator, and is published in the SCANNER with his permission.

"This paper will explore the different employment options for engineers. While the majority of engineers are employed directly by companies, recent changes in corporations have resulted in an increase in the number of engineers pursuing contract engineering, consulting, and other forms of self-employment. In this paper we will look at the pros and cons of each employment option and pose several questions that engineers should consider as they plan their careers."

"Whether you are in the first year of your career or the twentieth, there are several questions that you should ask yourself before making any career decisions:

- Where am I in my career? Is it where I want to be?
- Where am I going? Is it where I want to go? If not, how do I change direction?
- Do I have the skills I need to stay current with my present employer or remain in the same industry? To pursue a new direction?"

"After you have addressed these questions, you will need to consider how you want to work. For yourself? As a freelancer? In the womb of a company? Let's discuss these options."

Employment Options

"Most of us will start out and finish our careers working for a company, but an increasing percentage of engineers is pursuing alternatives. Whether by choice or because of circumstances beyond our control, we should be aware of the implications of the different employment options we can choose. In addition to direct employment, we will also look at contract employment, consulting, and owning your own business."

"Direct". "As a direct employee, you can expect to receive the following from your employer:

- A regular paycheck
- A medical plan
- A pension plan

- vacation
- A training program"

"Why work directly for a company? Many prefer the security of a direct employer, although in these changing times this may not be as true as in the past. Working directly for a company does provide access to the items listed, along with an organizational structure and defined paths for technical and personal growth."

"Contract". "The contract employee position has been evolving over the last few years. It involves working on a contract for a specific length of time, or until a project is completed. The increase in the number of people pursuing temporary positions has led to contract engineering houses, or job shops, to offer increased benefits to those contracting with them. As a contract employee you will receive an hourly rate, plus per diem if you are on a foreign or long-term travel assignment. In today's market, some contract firms offer paid vacation, the option to put money into a 401(k) plan or an SEP-IRA, and some medical coverage."

"Training may be one of the most essential areas that contract engineers need to keep current. Since you may work for different employers, you will need to be familiar with a variety of tools and prepared to learn new systems as quickly as possible. Since you may work for different employers, you will need to be familiar with a variety of tools, and prepared to learn new systems quickly. If you are seeking direct employment, contracting can lead to an offer of full-time employment."

"Consulting." "What is the difference between a contractor and a consultant? While a contractor works through a contract firm, a consultant is typically self-employed or part of a partnership, has to self-market, and frequently has multiple customers. In all states you will have to get a P.E. license if you plan to sell your services directly to the public."

"Like the contract engineer, you will be responsible for your own pension, medical plan, and training expenses. Depending on the type of company you set up, many of these expenses are tax-deductible. You will want to consult an accountant about what kind of company you set up."

"If you do set out on your own, you may want to consider forming alliances with other consultants. One way to do this is to join the Alliance of IEEE Consulting Networks (AICN). There are IEEE-sponsored consultants networks around the United States. For more information on the AICN, contact the IEEE USA office in Washington, DC, tel 202/785-0017."

Is Your Membership Information Accurate?

The 1997 membership renewal notice sent to you requested that all data be reviewed; additions, deletions and corrections made; and that your member profile sheet and invoice be returned with total amount due to IEEE. The Guide to Renewal 1997 contains many reasons to renew, including keeping your IEEE member benefits. However, the most important reason for continuing your membership is peer recognition in the world's largest technical professional society.

Please check the information requested in the accompanying form and include it in your renewal forms or send changes or corrections by any of the means listed. For **Life Members and Members**, please include your home address and, if applicable, your business address (or second address). Indicate your preferred address for receiving IEEE mail. The preferred address determines whether you belong to the Northern Virginia or Washington Section. Please consider having your home address as your preferred address. For **Student Members**, please show your current address while in school as your preferred address, and your permanent home address as your business address.

Member Data Correction Form

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Send to: IEEE Address Change, 445 Hoes Lane, P.O.Box 1331, Piscataway, NJ 08855-1331,
or by telephone to: (T) 1-800/678-4333; (F) 1-908/562-6388;
or by E-Mail to: address-change@ieee.org

"Self-Employment." "Self-employment takes many forms. It can be the consulting option just discussed, or it can include starting or buying a business. Many consider going into business for themselves as a way to achieve the freedom of being their own boss."

"If you have an idea that you believe could be turned into a successful business, you will want to start by developing a business plan. The Small Business Administration (SBA) can help you to assemble such a plan. Next comes a marketing plan. This requires you to identify your customers, and how you can reach them. Finally, you will need to obtain financing. This can take a wide range of forms from bank loans, SBA loans, or venture capital to credit cards. Typically, to get financing you will have to make sure you have the savings and other financial options to maintain your lifestyle during the start-up period."

"The Management Track vs. the Technical Track."

"If you *select* the option that the majority of engineers select—direct employment—you will also have to decide whether you want to pursue a management track or a technical track. Even in these times of corporate downsizing, shrinking management levels, and outsourcing, managers are still needed. Do you prefer to work with people? Or do you prefer to stay in the middle of the latest technical changes? The answers to these questions should also help you in deciding what size of company you want to work for. If you are interested in management, you may have a better opportunity at a large company than with a small company."

* (Excerpted with author's permission from an article entitled "Personal Positioning for Young Professionals." Copyright: "IEEE-USA PACE Conference and Workshop")

ELSEWHERE IN OUR PROFESSION

[The following items are excerpted from IEEE, National Institute of Standards and Technology (NIST), and the Aerospace Technology Committee of the National Air and Space Museum, Smithsonian Institution. Sources are provided where available.]

"Quiet" Copter Flight Tested

Seattle—This helicopter is intended as an "ultra quiet" flying "glass bottom boat" for tourists to the noise-sensitive Grand Canyon area. It is being developed by Papillon Grand Canyon Helicopters and Vertical Aviation Technologies, Orlando, FL. The S-55QT is a remanufactured S-r55 fitted with a Garrett TPE-331-10 configuration with a 6,000-hr time-before-overhaul. The helicopter, intended to seat up to nine passengers, has a new 5-bladed rotorhead and acoustically modified engine inlet and exhaust areas. The S-55QT also is equipped with large side and floor panoramic windows. The passenger cabin is air conditioned, has new design, large entry doors, and a 6-ft-high cabin ceiling.

(Aviation Week & Space Technology, Sep 1996, pg 66; no author listed)

It's For the Birds!

Birds are helping to reduce the number of bird strikes, a major safety concern. The four-month JFK Airport Falconry Program, sponsored by the Port of Authority of New York and New Jersey, started in June, and preliminary results are promising. Busy John F. Kennedy International Airport has one of the highest bird strike (sea gull) rates in the country, according to biologist Steven D. Garber, who heads the program. Traditional methods of reducing the airport bird population include federal government "bird shoots," and insect and plant management. The JFK program instead employs three falcons, three peregrine falcons and five Harris hawks, Garber said. The birds of prey are trained to "control" the locals—not by killing them, but by marking the airport as "territory" so other birds stay clear of the airport environs and departure/approach paths... Mother Nature's way. Garber says 300 bird strikes were recorded at JFK last year, two thirds of them from gulls. Early calculations show the program helped reduce the number of gull strikes by 75%. The research data could be skewed, as most traditional programs are still in place. Garber says the bird-of-prey program is the only one of its kind in use at a U.S. airport.

(Aviation Week & Space Technology, Sep 1996, pg 15; compiled by Frances Fiorino)

Cat Scan?

The House Science Committee was knee-deep in techno-babble about bomb detection at airports last week. After listening intently to descriptions of high-tech systems and deployment schemes to thwart terrorists, the panel wanted to know which technologies were best suited to the task. Much to members' surprise, they were told what may be the most effective is a hairy, four-legged machine with a super-sensitive olfactory equipment—a bomb-sniffing dog. The FAA already has 95 dogs at work at US airports, and plans to acquire another 56, according to FAA Administrator David R. Hinson. Besides smelling explosives, he said, dogs in terminals present a visual deterrent of their own.

(Aviation Week & Space Technology, Sep 1996, pg. 19; edited by James R. Asker)

Independent Review of Executive Support Aircraft

Defense Secretary William J. Perry has appointed former FAA Chief and retired Vice Admiral Donald D. Engen to lead an independent review of aircraft used by the President and other senior government officials. They include Air Force One and other aircraft operated by the 89th Airlift Wing at Andrews AFB, and helicopters flown by Marine Corps Sqdn HMX-1. The review will examine pilot selection and training, maintenance and equipment procedures and accident investigations. Perry ordered the review in the wake of two incidents in September involving Marine Corps CH-46 helicopters. One helo rolled over during taxi and burned, and another was forced to land in a field after a warning light came on. In addition, a USAF C-130 crashed after takeoff at Jackson Hole, Wyo, in August, killing all on board. Engen's panel is scheduled to report its recommendations to Perry by Oct. 10.

(Engen is the Director of the National Air and Space Museum.)

Engineers Focus on American-Made Flat Panel Displays

Anyone who has looked at the high-resolution color screen of a laptop computer has seen a flat panel display (FPD). Now similar technology has started to make its way into aircraft cockpits.

In new aircraft such as the F-22 and Boeing 777, full-color FPDs make it easier for operators to decode and react to all the flight information thrown at them. In other cases, FPDs are replacing existing cathode-ray tubes, the type of monitors used for television sets and desktop computer displays.

Engineers have long anticipated the shift to FPDs. The source of the new technology may come as a surprise: Much of it is made in the U.S. Although U.S. producers cannot begin to challenge the Japanese and Koreans in the vast consumer display market, they are certainly making a play in avionics.

(Aerospace America, Aug 1996, pg. 20-22; Alan S. Brown)

Looong Distance Phone Call

The 305-meter Arecibo Telescope in Puerto Rico, the world's largest radio telescope, has been given a much-needed overhaul. A new system was installed on the 33-year-old telescope to better focus radio waves, which will enable astronomers to make observations of faint radio sources 10 times faster than before. A new one-megawatt transmitter will improve radar studies of solar system objects by a factor of 20. Arecibo could now listen in on cellular phone calls on Venus and detect golfballs at the moon's distance.

(Astronomy, Sep 1996, pg 30; no author listed)

Seasons Greetings

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A Piece of Jupiter on Earth

Lawrence Livermore National Laboratory scientists have recently synthesized liquid metallic hydrogen, the most abundant substance in the solar system, not counting the Sun. Liquid metallic hydrogen is the stuff deep in Jupiter's interior that's responsible for the planet's stupendous magnetic field. Hydrogen is normally a gas, but on Jupiter, the overlying atmosphere squeezes it into a 40,000-km-thick cloud of liquid, where it behaves like a metal. The scientists created the substance by trapping hydrogen in a cell and using shock waves to compress it to a pressure of 1.4 million atmospheres.

(Astronomy, Sep 1996, pg 30; no author listed)

Robo Copter

Carnegie Mellon University's robotic helicopter was designed for missions too dangerous for humans, such as fire fighting and search-and-rescue. The machine's distinctive vision system locks onto objects on the ground, then automatically keeps them in view while it hovers above. The 14-foot-long autonomous helicopter was developed from a Yamaha crop duster.

(Popular Science, Sep 1996, pg. 9; edited by Mariette Di Christina)

Supersonic Nose Job

NASA has flight-tested a "windowless" landing system that would cut the droopy nose off the Concorde and other SSTs. "Synthetic vision" replaces forward-looking windows with a high-resolution display that uses a digital video camera, infrared cameras, and microwave radar. The pilot no longer needs to see directly in front, so it's good-bye to the costly, complex mechanical nose. NASA hopes to have the system available by the year 2000.

(Popular Science, Sep 1996, pg. 8; edited by Marietta Di Christina)

Getting Inside Special Effects

A new tool for creating breathtaking images gets movie special-effects wizards out from in front of a computer screen and into virtual reality. A software program called "Virtual Director," used for the first time in an Imax film called Cosmic Voyage, puts the film maker inside the shot.

The special effects for Cosmic Voyage were created by an operator standing in a 10-foot cube-shaped room called a CAVE (Computer-Assisted Virtual Environment). Stereographic video images were rear-projected on the walls creating a fused three-dimensional image that seemed to hang in space and surround the operator. Using a 3-D tracking handset, the operator virtually navigated among the images, scaling them as desired—so, for example, galaxies appeared to be light-years apart or small enough to fit into the palm of a hand. Camera movement through the simulated environment was controlled through a magnetic tracking wand and a wireless microphone for voice commands.

The camera shots made inside the CAVE were then placed in another software program called Star Renderer that also was expressly developed for the making of Cosmic Voyage. Final processing of the film took place on a Silicon Graphics Power Challenge Array computer at the University of Illinois' National Center for Supercomputing Applications. The challenge was to convert more than 100 gigabytes of data—an unprecedented sum—into the same amount of imagery. The challenge was met, and viewers can travel to the outer reaches of space or into the smallest forms of life in one long continuous zoom.

(Popular Science, Sep 1996, pg. 36, F.V.)

Graduate Studies in Electrical Engineering Course Offerings - January 1997

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NASA's Spacecraft Will Get Smaller and Smaller

Pasadena, Ca—Look under the hood of NASA's oldest satellite, and you'll find electronic circuits that seem primitive compared to, say, a digital video recorder or laptop computer. When these early space probes were designed, very-large-scale integrated circuits didn't exist.

With its next generation of space probes, NASA promises to push the science of miniaturization into new frontiers. By way of comparison, the space agency's current state-of-the-art research satellite is the compact-car-size near-Earth asteroid rendezvous spacecraft, which weighs about a ton. A comparable spacecraft now being designed by the Spacecraft Engineering Section of the Jet Propulsion Laboratory as part of the Second-Generation Microspacecraft technology program will be only as big as a toaster, and weigh 11 pounds.

NASA hopes to see these "toasters" in space by 2010. And the years

beyond 2010 may hold even smaller promise. At the Johnson Space Center in Houston, engineers are testing prototypes of fingernail-size space probes called "pixelsats." Released by the thousands, each one would send back only a small piece of information, such as a pixel of an image of a distant asteroid. Pixelsats nearest our planet would send information to earthbound computers that would assemble individual pixels into larger images to provide the "big picture." Swarms of pixelsats would also exchange information.

Just how far will miniaturization go? Experts in nanotechnology working at IBM and university research laboratories have successfully manipulated molecules to form transistors and connecting wires. Assuming the bugs are worked out, there are apparently no technical barriers to building space probes the size of bacteria.

(Popular Mechanics, Sep 1996, pg 15; editor/writer: Jim Wilson)

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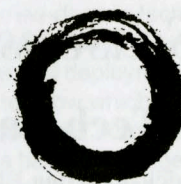
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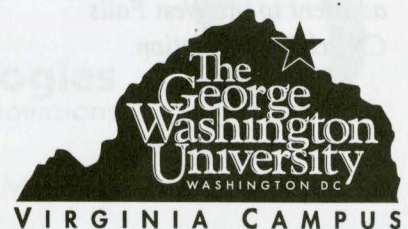
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