2004 IEEE AWARDS

IEEE

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Letter from IEEE President Arthur W. Winston

IEEE Members and Friends,

When you read the short biographies of the 2004 IEEE Award recipients honored in this booklet, I hope you will feel the pride I do in being a member of this magnificent community of technical professionals. Joining the ranks of such pioneers as Marconi, Bell, Shockley, Noyce and Moore is a remarkable group of innovators who have made enormous contributions to science, technology, the engineering profession and the IEEE. Their achievements personify the IEEE vision to advance global prosperity by fostering technical innovation, enabling professionals' careers and promoting community worldwide.

Who could have imagined 40 years ago that satellite communications, control systems design for space stations, weather radars, programming languages and semiconductors would play such huge roles in our everyday lives? The visionaries we honor this year did. Their work extended the global reach of technology and allowed others to build on their extraordinary developments.

With these awards, the IEEE recognizes that these talented and brilliant individuals also have helped to further the mission of the IEEE to promote the creation of new technologies for the benefit of humanity and the profession.

As 2004 IEEE president, I have the unique privilege of personally congratulating many of these exceptional achievers who stand out among their peers. As you read and reflect on the accomplishments of these honorees, I encourage you to think about those others who have led developments in your areas of expertise; those whose work has influenced you. Consider nominating the leaders and the role models in your field for an IEEE Award. The greatest honor is being recognized by one's peers.

IEEE President
Arthur W. Winston

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Centennial of ETA KAPPA NU

Eta Kappa Nu (HKN), the scholastic honor society for Electrical and Computer Engineering (ECE), will celebrate its 100th anniversary in October 2004. Formed by students at the University of Illinois in 1904, its goals and activities have changed with the times. The society's original purpose was to help graduating students find jobs and, in other ways gain, a foothold in their careers. Today, Eta Kappa Nu encourages excellence in education and in achievements by students, educators and career engineers. There are nearly 200 college chapters in the United States that carry out a variety of activities, many of which will have their own centennial activities. There are also a few alumni chapters.

Membership in HKN is by invitation, based on qualifications, and consists of election and induction. Since its inception, about 200,000 Members and 101 Eminent Members have been inducted. Generally, to qualify scholastically, ECE students must be in the upper fourth of their junior class or in the upper third of their senior class, or graduate students with similar distinction. ECE faculty also qualify, as well as career engineers who have done meritorious work in the profession or allied fields. Eminent Members are those few whose technical achievements and contributions to society through leadership in the field of electrical and computer engineering have resulted in significant benefits to humankind.

Many Eminent Members are IEEE leaders, IEEE Fellows and recipients of IEEE Awards. Eta Kappa Nu recognizes annually a number of achievements in scholarship, education, engineering and service to HKN through its awards program.

Distinguished Colleagues and Friends,

For nearly a century, the IEEE Awards program has paid tribute to extraordinary technical professionals whose exceptional achievements and outstanding contributions have made a lasting impact on technology, society and the engineering profession. As IEEE Awards Board Chair, it gives me great pleasure to share that tradition of public recognition with you this year.

As you read through this booklet, you will see that IEEE Awards honor accomplished individuals in education, industry, research and service, as well as corporate leaders. These awards celebrate innovations that encompass the breadth of many IEEE technical areas of interest from computer science, electrical engineering, information technologies and microelectronics, to optoelectronics, radar technologies, signal processing and beyond.

The 2004 IEEE Awards would not be possible without the sponsorship of some of the world's leading corporations, foundations and individuals (listed below) whose interest in the IEEE's technological disciplines are shown by their support. On behalf of the IEEE Awards Board, I would especially like to recognize the support provided by the IEEE Foundation. Through its philanthropic programs, the IEEE Foundation encourages excellence in engineering at the highest level and promotes public awareness of the long-reaching effects of the work of engineers.

I encourage you to join me in participating in the IEEE Awards program by nominating one of your distinguished colleagues. On page 27 of this booklet you will find a Potential Nominee Form, which takes only moments to complete and submit. Help decide who will receive the prestigious IEEE Awards of the future. Please forward any comments or questions to awards@ieee.org.

IEEE Awards Board Chair
Dov Jaron

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IEEE Microwave Theory and Techniques Society
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IEEE Signal Processing Society
IEEE Solid-State Circuits Society
IEEE Standards Association
IEEE Technical Activities Board

2004 IEEE Medal of Honor

"For contributions to digital satellite communications, promotion of information technology R&D, and technical and corporate leadership in computers and communications."

Tadahiro Sekimoto

Over the past half-century, Dr. Tadahiro Sekimoto has contributed significantly to the enormous growth of the NEC Corporation and Japan's electronics industry. Highly successful in developing commercial applications, his seminal work in digital and satellite communications formed the cornerstone for modern communications systems. His push to integrate computers and communications, an idea proposed in 1977 by then-chairman Dr. Koji Kobayashi, helped to establish the information technology industry and a worldwide information society.

From 1948 to 1965, Dr. Sekimoto developed innovative communications technology at NEC's Central Research Laboratories in Tokyo. He designed early pulse-code modulation equipment as well as coding and decoding circuitry. During the late 1960s, he developed a time-division multiple access system and automatic routing system that had a huge impact on satellite communications. These technologies also formed a foundation for cellular telephony decades later.

During a two-year assignment at COMSAT in Washington, D.C. from 1965 to 1967, he led the development of single-channel-per-carrier pulse-code-modulation multiple-access demand-assignment equipment (SPADE). Commercialized by Intelsat in the early 1970s, SPADE made it economically feasible for developing countries to participate in worldwide satellite communications networks.

Dr. Sekimoto was elected to NEC's board of directors in 1974 and appointed president in 1980. He guided the company's colossal sales growth from 893 billion yen (US$4.7 billion) in 1980 to 2,899 billion yen (US$30.5 billion) in 1993. During his tenure, the company consistently ranked among the top five worldwide in communications, computer and semiconductor sales. NEC also established three overseas laboratories and 33 plants in 16 countries, as well as basic research facilities in Tsukuba, Japan and Princeton, New Jersey. Named chairman of the board in 1994, Dr. Sekimoto is currently chairman of the Institute for International Socio-Economic Studies, an NEC think tank subsidiary.

An IEEE Life Fellow, Dr. Sekimoto is a foreign associate of the U.S. National Academy of Engineering. His awards include the IEEE Alexander Graham Bell Medal, the IEEE Communications Society's Edwin Howard Armstrong Achievement Award, the American Institute of Astronautics and Aeronautics' Aerospace Communications Award and the Emperor of Japan's Grand Cordon of the Order of the Sacred Treasure. The author of numerous technical publications and seven books, Dr. Sekimoto holds 35 Japanese patents and five patents issued overseas.

The IEEE Medal of Honor is the highest award of the IEEE. Established in 1917, its earliest recipients were Major Edwin H. Armstrong for his "oscillating and non-oscillating audio" and Guglielmo Marconi for his early work in radio.

Sponsored by the IEEE Foundation, with support from the Frank A. Cowan Fund when awarded in the field of communications, the medal is awarded for an exceptional contribution or an extraordinary career in the IEEE fields of interest.

The award consists of a gold medal, bronze replica, certificate and honorarium.

2004 IEEE Edison Medal

"For a career of highly creative and influential contributions to heterostructure devices and materials."

Federico Capasso

Operating at the interface between applied and basic solid-state science, Dr. Federico Capasso has long been recognized by his colleagues as a trailblazer in the fields of semiconductors and lasers.

At Bell Labs in Murray Hill, New Jersey, Dr. Capasso pioneered the design of artificially structured materials and devices using semiconductor heterostructures. This approach, known as band-structure or bandgap engineering, allows devices to be tailored to specific applications, opening up research directions and commercial possibilities in photonics, electronics and nanotechnology. His seminal work on the quantum cascade (QC) laser has similarly revolutionized infrared science and technology by giving access to the mid-infrared spectrum. QC lasers have found wide-ranging applications in chemical sensing, medical diagnostics, spectroscopy and trace gas analysis. Dr. Capasso's many other contributions include multilayer low-noise avalanche photodiodes and the solid-state photomultiplier. His influential work in the mid-1980s with quantum electron devices revived interest in multilevel logic and coding.

Dr. Capasso launched his 26-year career at Bell Labs in 1977 as a member of the technical staff. He was vice president of physical research from 2000 to 2003, when he left to become the Robert L. Wallace Professor of Applied Physics at Harvard University in Cambridge, Massachusetts.

A Fellow of the IEEE, American Physical Society, Institute of Physics, American Academy of Arts and Sciences and Optical Society of America (OSA), Dr. Capasso is a member of the U.S. National Academy of Sciences and the U.S. National Academy of Engineering. His honors include the IEEE David Sarnoff Award and OSA's R.W. Wood Prize. He has published more than 300 papers and holds over 40 U.S. patents.

The IEEE Edison Medal was established in 1904 to celebrate the invention of the electric light bulb, which brightened the way for new scientists and engineers who have followed in Edison's footsteps.

The medal is awarded to an individual for a career of meritorious achievement in electrical science, electrical engineering or the electrical arts.

Sponsored by the IEEE Foundation and the IEEE Edison Medal Fund, the award consists of a gold medal, small gold replica, certificate and honorarium.

2004 IEEE Founders Medal

"For leadership across many fields of science and engineering through research and education, and for exceptional and unique contributions to the profession."

Mildred S. Dresselhaus

Dr. Mildred S. Dresselhaus' career combines research accomplishments at the highest level with sustained leadership, advocacy and service on behalf of the engineering and science professions. A voice for national competitiveness and security, she served as director of the Office of Science in the U.S. Department of Energy from 2000 to 2001.

One of 12 institute professors at the Massachusetts Institute of Technology (MIT) in Cambridge, Massachusetts, where she has taught since 1967, Dr. Dresselhaus also directed the MIT Center for Materials Science and Engineering from 1977 to 1983. Her research has been at the forefront of advances in carbon materials science, and her peers call her work on carbon nanotubes among the most exciting in nanoscale development.

Since the mid-1970s, Dr. Dresselhaus has campaigned to improve women's access to careers in technology and science. Her 1975 article "Some Personal Views on Engineering Education for Women" *(IEEE Transactions on Education)* remains both valuable and relevant. Serving as a role model, she has mentored, formally and informally, countless young women at MIT and around the world.

An IEEE Life Fellow, Dr. Dresselhaus is a member of the U.S. National Academy of Engineering and the National Academy of Sciences. She chairs the governing board of the American Institute of Physics and has served as treasurer of the U.S. National Academy of Sciences and as president of the American Physical Society and the American Association for the Advancement of Science. Her numerous awards include a Fulbright fellowship and the U.S. National Medal of Science.

The IEEE Founders Medal honors the three leaders whose vision and service created the IEEE: Alfred N. Goldsmith, John V.L. Hogan and Robert Marriott.

The medal, established in 1952, is granted annually to an individual for outstanding contributions in the leadership, planning and administration of affairs of great value to the electrical and electronics engineering profession.

Sponsored by the IEEE Foundation, the award consists of a gold medal, bronze replica, certificate and honorarium.

2004 IEEE James H. Mulligan, Jr. Education Medal

"For exemplary contributions to electrical engineering education through mentoring of students, an influential textbook, and University-wide academic leadership."

Paul R. Gray

The executive vice chancellor and provost at the University of California at Berkeley (UC Berkeley), Dr. Paul R. Gray has equipped a generation of integrated circuit designers to excel in industry and academia. His students have won numerous prizes, including four Best Paper Awards at the IEEE International Solid-State Circuits Conference and many *IEEE Transactions on Circuits and Systems* and *IEEE Journal of Solid-State Circuits* Best Paper Awards.

Since joining UC Berkeley's department of electrical engineering and computer sciences (EECS) in 1971, Dr. Gray has held a number of administrative posts, including department chairman from 1990 to 1993 and dean of engineering from 1996 to 2000. He helped redesign the EECS undergraduate curriculum, established a department of bioengineering and championed interdisciplinary initiatives in health science and nanotechnology.

Dr. Gray is the co-author of the widely used 1977 textbook "Analysis and Design of Analog Integrated Circuits." Expanded in successive editions, it remains the standard reference work for the field. He has co-edited two other texts, contributed to more than 130 papers and holds 13 U.S. patents.

An IEEE Fellow and member of the U.S. National Academy of Engineering, Dr. Gray has served as editor of the *IEEE Journal of Solid State Circuits* and as president of the IEEE Solid-State Circuits Council (now the IEEE Solid-State Circuits Society). He is a past member of the Engineering Deans Council of the American Society for Engineering Education, and has received numerous awards including the IEEE W.R.G. Baker Prize Paper Award and the IEEE Solid-State Circuits Award.

The IEEE Education Medal was established in 1956 to recognize the importance of educators in the field of engineering. It was renamed in 1999 to honor James H. Mulligan, Jr., a highly esteemed educator and the 1971 president of the IEEE.

Each year, the medal is awarded for a career of outstanding contributions to education in the fields of interest of IEEE.

Sponsored by The MathWorks, Inc., National Instruments Foundation, Pearson Prentice Hall and Xilinx, Inc., the award consists of a gold medal, bronze replica, certificate and honorarium.

2004 IEEE Simon Ramo Medal

"For significant contributions to systems engineering and technical leadership of control systems design for the orbiting space station Mir (Peace)."

Boris E. Chertok and Nikolai N. Sheremetevsky

Professor Boris E. Chertok and Dr. Nikolai N. Sheremetevsky have made invaluable contributions to the Soviet/Russian space program, most notably the control systems of the Mir space station. For 15 years, research conducted on the Mir fostered breakthroughs in astronomy, space science, medicine and other disciplines.

During the Mir's development, Professor Chertok was responsible for the electrical energy and electronic systems of the orbital complex. His design of the orientation control system and the diagnostics system enabled the control of all onboard systems.

Dr. Sheremetevsky championed the development of new gyroscopes to orient and stabilize both the Mir and Salute space stations. His teams developed gyroscopic control systems that achieved an accuracy of less than one degree/minute, a system that orients solar panels for a 90-kW power supply and engines that provide automatic orientation of the ship's communications antennas.

Professor Chertok joined the Research Institute of Aircraft Industry in 1930 as an electrical engineer. From 1945 to 1947, he served as the Head of the Research Institute on Rocket Technique in Bleiherode, Germany, where he worked as deputy principal designer on control systems for rockets and space apparatus from 1947 to 1951. Professor Chertok served as deputy to the principal designer at the Central Design Bureau from 1951 to 1966 and at the Rocket and Space Ënergy Corporation from 1966 to 1992. At Ënergy, he serves as head research consultant. He is a professor at Bauman Moscow Technical University and Head of the Chair (Control of Movement) of the Moscow Physical-Technical Institute. An academician of the Russian Academy of Sciences, Professor Chertok is a recipient of the highest award in Russia, Hero of Socialist Labor, and a recipient of the Lenin Prize.

Dr. Sheremetevsky joined the Scientific and Industrial Enterprise All-Russia (then All-Union) Research Institute for Electromechanics in Moscow in 1941. Hired as a researcher, he became head of the laboratory in 1949, first deputy director for research in 1954 and general director and general designer in 1974. From 1991 until his death in 2003, he served as the advisor to the Institute's director. Dr. Sheremetevsky was an academician of the Russian Academy of Sciences, a Hero of Socialist Labor, and a recipient of the Lenin Prize in 1978.

The IEEE Simon Ramo Medal, sponsored by TRW Foundation, was established in 1982 in recognition of Dr. Simon Ramo, former Vice Chairman of the Board of TRW, Inc. Given for exceptional achievement in systems engineering and systems science, the award consists of a gold medal, bronze replica, certificate and honorarium.

2004 IEEE Medal for Engineering Excellence

"For pioneering development of empirical models for predicting electric arc incident energy, and development of protective clothing classes based upon layering of flame resistant fabrics."



Richard L. Doughty, H. Landis Floyd, II and Thomas E. Neal

The combined efforts of Mr. Richard L. Doughty, Mr. H. Landis Floyd, II and Dr. Thomas E. Neal have resulted in extraordinary advances in electrical safe work practices, including the transformation of arc flash safety from an unknown to an embedded safety practice.

While working for E.I. duPont de Nemours & Co. in Wilmington, Delaware, these three pioneers developed empirical models for predicting arc flash exposure energy and established an arc rating system for protective clothing and equipment. Their prize-winning papers have enabled engineers to predict electrical worker exposures in arc flash accidents, apply personal protective clothing and equipment with the appropriate arc ratings and evaluate power system design options. Their work has impacted all U.S. codes, standards and regulations related to electrical safe work practices, hazard analysis and arc flash protective clothing and equipment performance. Mr. Doughty, Mr. Floyd and Dr. Neal directly stimulated the creation of a $1 billion/year market in arc flash protective apparel and equipment in the United States, which earned them the 2003 DuPont Engineering Excellence Award.

Prior to retiring from DuPont in 1999, Mr. Doughty served as a principal consultant in the electrical technology consulting group and leader of the corporate motor technology team. In these roles, he conducted arc flash tests to better define the characteristics of electric arcs and arc flash energy, and developed empirical formulas to determine incident energy with reasonable accuracy. A Fellow of the IEEE, Mr. Doughty was active on several IEEE Standards working groups, serving as chair of working group 841(IEEE Standard for the Petroleum and Chemical Industry-Severe Duty Totally Enclosed Fan-Cooled (TEFC) Squirrel Cage Induction Motors-Up to and Including 500 hp). He has received an IEEE Standards Medallion, the IEEE Industry Applications Society (IAS) Petroleum and Chemical Industry Committee's (PCIC) David C. Azbill Award and the Russell W. Mills Award. Mr. Doughty has published 24 technical papers.

Mr. Floyd is a senior consultant with DuPont and leader of the corporate electrical safety team. A primary focus of his work is establishing and facilitating systems and technologies critical to electrical safety. A Fellow of the IEEE, he is president-elect of IAS, vice chair of the IAS PCIC, a member of IEEE Standards Coordinating Committee 18 (National Fire Protection Association Standards) and co-founder of the IAS Electrical Safety Workshop. A recipient of the IEEE Richard Harold Kaufmann Award, he is a Professional Member of the American Society of Safety Engineers and director of the Electrical Safety Foundation International. He has co-written 25 papers on electrical safety.

Dr. Neal retired from DuPont in 1999 and now serves as principal consultant for Neal Associates Ltd. in Guilford, Connecticut. As technology manager of DuPont's Advanced Fibers Systems Thermal Testing Laboratory, Dr. Neal focused on protective clothing products and test methods for electric arc flash and flash fire hazards. An IEEE Senior Member, Dr. Neal is vice-chair of the American Society for Testing and Materials (ASTM) F23 Committee on Protective Clothing, chair of the ASTM E54.04 (Homeland Security Subcommittee on Personal Protective Equipment), a member of the IEEE P1584 (Guide for Performing Arc-Flash Hazard Calculations) Standard Working Group and leader of three ASTM F18 Task Groups for Arc Resistant Protective Clothing and Equipment. He is a recipient of the DuPont Corporate Marketing Award and has published 12 technical papers.

The IEEE Medal for Engineering Excellence was established in 1986, and was created to recognize exceptional achievement in application engineering in the technical disciplines of the IEEE, for the benefit of the public and the engineering profession.

Sponsored by Siemens AG, the award consists of a gold medal, bronze replica, certificate and honorarium.

2004 IEEE Richard W. Hamming Medal

"For fundamental contributions to the theory and practice of information transmission and storage."

Jack Keil Wolf

Over the past four decades, Dr. Jack Keil Wolf has been a driving force in the evolution of information, coding and communication theories. He remains one of the most productive cross-fertilizers in engineering research, successfully importing techniques used in one field to obtain unexpected results in another. Among his and his students' achievements are contributions to the design and analysis of satellite and cellular communication systems, and hard disk drives.

Early in his career, Dr. Wolf established himself as a major innovator in the fields of information and coding theory through contributions such as the Slepian-Wolf theory for correlated information sources. In 1984, he left his faculty position at the University of Massachusetts in Amherst to join the Center for Magnetic Recording Research at the University of California in San Diego. By applying his knowledge of communication and information theory to the magnetic recording industry, he pioneered the field of coding for the magnetic recording channel. His biggest theoretical contribution was to design code with performance that was boosted by channel memory, rather than hindered by it. Now the Stephen O. Rice Professor in the department of Electrical and Computer Engineering, Dr. Wolf has also held a part-time appointment at QUALCOMM, Inc. in San Diego, California, since its formation in 1985.

An IEEE Life Fellow, Dr. Wolf served as president of the IEEE Information Theory Society in 1974. He also is a Fellow of the American Association for the Advancement of Science, a member of the U.S. National Academy of Engineering and a Guggenheim Fellow.

A pioneer in computer and computing science, Richard W. Hamming played a central role in the field of information science. Among his many personal contributions was the development of error-correcting codes.

Established in 1986, the medal recognizes exceptional contributions to information sciences, systems and technology.

Sponsored by AT&T Labs, the award consists of a gold medal, bronze replica, certificate and honorarium.

2004 IEEE John von Neumann Medal

"For fundamental contributions to programming languages, programming methodology, and distributed systems."

Barbara H. Liskov

A pioneer in object-oriented programming, Dr. Barbara H. Liskov is perhaps best known for her seminal work on data abstraction, a fundamental tool for organizing programs. Her research in the early 1970s led to the design and implementation of CLU, the first programming language to support data abstraction. Since 1975, every important programming language, including Java, has borrowed ideas from CLU.

Dr. Liskov's other extraordinary contributions include the Venus operating system, the Argus distributed programming language and system and the Thor system for robust replicated storage of persistent objects. Argus was a groundbreaking high-level programming language used to support implementation of distributed programs that run on computers connected by a network, such as the Internet. Her recent efforts have concentrated on language-based security and on making Byzantine fault tolerance practical.

Dr. Liskov is the Ford Professor of Engineering at the Massachusetts Institute of Technology in Cambridge, Massachusetts, where she has taught since 1972. In 2001, she became the associate head for computer science in the Electrical Engineering and Computer science department. In the 1960s, Professor Liskov held positions at the Mitre Corporation in Bedford, Massachusetts; Harvard University in Cambridge, Massachusetts; and Stanford University in Palo Alto, California.

A member of the IEEE and the U.S. National Academy of Engineering, Dr. Liskov is a Fellow of the American Academy of Arts and Sciences and of the Association for Computing Machinery. She has written three books including, "Abstraction and Specification in Program Development," as well as more than 100 technical papers.

John von Neumann was an eminent mathematician whose work at Princeton University's Institute of Advanced Study led to the IAS binary stored-program computer in 1952. That breakthrough became the foundation for computers today.

The medal, established in 1990, is granted for outstanding achievements in computer-related science and technology.

Sponsored by IBM Corporation, the award consists of a gold medal, bronze replica, certificate and honorarium.

2004 IEEE Jack S. Kilby Signal Processing Medal

"For fundamental contributions to digital filter design and interpolation, especially the Parks-McClellan algorithm."

Thomas W. Parks and James H. McClellan

Working together and individually, Drs. Thomas W. Parks and James H. McClellan have profoundly impacted digital signal processing. In the early 1970s, while Dr. McClellan was a graduate student at Rice University in Houston, Texas, they collaborated to apply the Remez exchange algorithm to the Chebyshev filter design problem and produce the Parks-McClellan algorithm. The resulting program remains the standard for designing linear-phase finite impulse response (FIR) digital filters and is widely used in areas such as communications, signal processing and array design. Dr. McClellan's Ph.D. thesis introduced the McClellan transformation, which simplifies the design of 2-D filters used in image and seismic processing for oil exploration.

In 1986, Dr. Parks joined Cornell University in Ithaca, New York as a professor of electrical engineering, after spending 19 years in this capacity at Rice University. An IEEE Fellow, his previous honors include the IEEE Signal Processing Society's Technical Achievement Award, an IEEE Third Millennium Medal and the Alexander von Humboldt Foundation's Senior Scientist Award. He has served as a Distinguished Lecturer for the IEEE Signal Processing Society. Both he and Dr. McClellan made key contributions to the widely respected textbook "Computer-Based Exercises in Signal Processing: Using MATLAB 5."

Dr. McClellan is the Byers' Professor of Signal Processing at the Georgia Institute of Technology in Atlanta, where he has taught since 1987. He previously held positions at the Massachusetts Institute of Technology in Cambridge, Massachusetts, and Schlumberger Well Services in Austin, Texas. The co-author of award-winning textbooks, he led Georgia Tech in developing an introductory digital signal processing course. An IEEE Fellow and recipient of the IEEE Third Millennium Medal, Dr. McClellan has served as a Distinguished Lecturer for the IEEE Signal Processing Society and was twice named Georgia Tech's ECE Senior Class Outstanding Teacher.

Jack Kilby's innovative work was a monumental precursor to the development of the signal processor and digital signal processing. The medal, established in his honor in 1995, is awarded for outstanding achievements in signal processing.

Sponsored by Texas Instruments, Incorporated, the award consists of a gold medal, bronze replica, certificate and honorarium.

2004 IEEE Dennis J. Picard Medal for Radar Technologies and Applications

"For exceptionally outstanding leadership and significant individual technical contributions to the application of radar for the observation of weather and other atmospheric phenomena."

David Atlas

Dr. David Atlas is one of the founding fathers of radar meteorology. There is scarcely an area within the field that he has not significantly influenced.

After serving as one of the first U.S. Army Air Corps radar meteorologists during World War II, Dr. Atlas spent 18 years as the chief of the U.S. Air Force Cambridge Research Laboratories' Weather Radar Branch in Bedford, Massachusetts, where he predicted the importance of Doppler in weather radar and studied its use to measure winds. He was a professor of meteorology at the University of Chicago from 1966 to 1972, and he directed the Atmospheric Technology Division at the National Center for Atmospheric Research (NCAR) in Boulder, Colorado from 1972 to 1976. His efforts at NCAR led to major advancements in weather radar use and paved the way for the U.S. National Weather Service and the Federal Aviation Administration to use Doppler radar to measure severe weather.

In 1977, Dr. Atlas became founding director of the Laboratory for Atmospheric Sciences at the NASA Goddard Space Flight Center in Greenbelt, Maryland. There, he drove the development of space-based instruments for monitoring the earth's atmosphere, oceans and cryosphere. Since retiring in 1994, he continues his research at Goddard as a Distinguished Visiting Scientist.

Dr. Atlas is a Fellow of the American Geophysical Society, the U.K. Royal Meteorological Society and the American Meteorological Society (AMS), serving as AMS president in 1975. His honors include the Royal Meteorological Society's Symons Gold Medal. A member of the U.S. National Academy of Engineering, Dr. Atlas holds 22 patents and has published more than 260 papers.

The IEEE Dennis J. Picard Medal for Radar Technologies and Applications was established in 1999 for outstanding accomplishments in advancing the fields of radar technologies.

The award consists of a gold medal, bronze replica, certificate and honorarium. The medal is funded through an endowment from Raytheon Company.

2004 IEEE Robert N. Noyce Medal

"For contributions to semiconductor manufacturing technology and leadership in business and in industry initiatives."

Craig R. Barrett

Dr. Craig R. Barrett, chief executive officer of Intel Corporation in Santa Clara, California, has made profound contributions to the semiconductor industry. Since joining Intel in 1974, he has driven significant improvements to the company's process control, statistical analysis and problem solving.

Dr. Barrett fine-tuned Intel's manufacturing process, thereby improving yields and developing a higher quality materials supply base; fueling enhancements in quality consciousness; and introducing a standardization methodology that allowed processes to be transferred from site to site, resulting in improved factory performance. Today, Intel provides microprocessors for over 80 percent of the world's computers.

An industry spokesman, Dr. Barrett serves on numerous boards including those of the Semiconductor Industry Association and SEMATECH. He has led the development of the Technology Roadmap for Semiconductors and the University Focus Research Program, which funds and coordinates semiconductor research efforts for universities. He also has championed issues important to public policy; research and development; environment, health and safety; and education.

Prior to joining Intel, he spent ten years on the faculty of the department of Materials Science and Engineering at Stanford University in Palo Alto, California.

An IEEE Senior Member, Dr. Barrett is a member of the U.S. National Academy of Engineering and sits on the board of Achieve, Inc. A recipient of a Fulbright and a NATO postdoctoral fellowship, he is the author of a textbook, "Principles of Engineering Materials," and more than 40 technical papers. Under Dr. Barrett's leadership, Intel's educational outreach has focused on improving math and science education and encouraging students to enter technical careers.

The IEEE Robert N. Noyce Medal was established in 1999 to recognize exceptional contributions to the microelectronics industry. Preference is given to individuals who have demonstrated contributions in multiple areas including technology development, business development, industry leadership, technology policy development and standards development.

The award consists of a gold medal, bronze replica, certificate and honorarium. The medal is funded through an endowment from Intel Foundation.

2004 IEEE Jun-ichi Nishizawa Medal

"For lifetime contributions to microelectronics processing, including lithographic simulation, semiconductor lasers and magnetic recording."

Frederick H. Dill

Since 1958, when he joined the IBM Research Division, then in Poughkeepsie, New York, Dr. Frederick Dill, the inaugural recipient of the IEEE Jun-ichi Nishizawa Medal, has done seminal work in a wide range of fields.

Dr. Dill's early achievements include essential contributions to semiconductor lasers and to building high-speed integrated circuits using germanium. In the 1970s, he headed research that led to pioneering process models and materials characterization for photolithography. His work helped transform device lithography from an art to an engineering science. His papers are still referenced today, and the parameters used to describe photoresist exposure are called "The Dill Parameters." In the 1980s, Dr. Dill was lead inventor of video RAM. Currently, he works on disk drive recording heads to improve their capacity. Today's disk drive heads are built using processes he pioneered.

An IEEE Life Fellow, Dr. Dill has served on the IEEE Board of Directors as Division I Director. He also served as president of the IEEE Electron Devices Society and on the society's Administrative Committee. He helped establish several IEEE journals including the *IEEE Journal of Technology -- Computer Aided Design*, the first IEEE all-electronic journal.

Inaugurated into the U.S. National Academy of Engineering in 1990, Dr. Dill subsequently chaired the Academy's Electronics Engineering section. He also was one of the early presidents of IBM's Academy of Technology. A recipient of an IEEE Centennial Medal and an IEEE Third Millennium Medal, Dr. Dill holds more than 30 patents, including fundamental patents on automated tools for thin-film measurements.

IBM promoted Dr. Dill to Distinguished Engineer in 2002. He joined Hitachi Global Storage Technologies in San Jose, California, following IBM's sale of the disk drive business. There, he is an executive engineer solving manufacturing process problems.

In 2002, the IEEE Jun-ichi Nishizawa Medal was established in honor of the "Father of Japanese Microelectronics." A remarkable innovator, who thrives on challenging conventional thinking, Dr. Jun-ichi Nishizawa has made profound contributions to materials science and technology, fiber optics, optical communications and other areas. The award recognizes outstanding contributions to material and device science and technology, including practical application. The year 2004 marks the medal's first presentation.

Funded through an endowment from the Semiconductor Research Foundation and the Federation of Electric Power Companies, Japan, the award consists of a gold medal, bronze replica, certificate and honorarium.

2004 IEEE Richard M. Emberson Award

"For his vision and leadership on behalf of the Institute's technical and educational activities, particularly electronic delivery of technical and educational information."

Kenneth R. Laker

Dr. Kenneth R. Laker's enthusiasm and dedication have been the driving force behind the IEEE's Internet initiatives. He was an early motivator behind what became the IEEE website, the award-winning IEEE Virtual Museum and IEEE *Xplore*®, the online delivery system for IEEE publications.

Equally active in pursuing IEEE's educational goals, Dr. Laker made key contributions to the Sloan Career Cornerstone Series, a multimedia career resource for university students. Originally developed in the mid 1990s, this resource is now entirely web-based as a result of his influence. As vice president of IEEE Educational Activities, Dr. Laker initiated the establishment of IEEE Presidents' Scholarship, as well as spearheaded Industry 2000, the first IEEE global initiative to develop industry support for continued professional development.

Dr. Laker is the Alfred Fitler Moore Professor of Electrical Engineering at the University of Pennsylvania in Philadelphia, where he has taught since 1984 and served as department chair until 1993. He also is a co-founder of DFT Microsystems in Norristown, PA. He has held positions with the U.S. Air Force Cambridge Research Labs in Cambridge, Massachusetts and AT&T Bell Labs in Holmdel, New Jersey.

An IEEE Fellow and IEEE History Center Trustee, Dr. Laker's three decades of IEEE service include terms on the IEEE Board of Directors as President and Division I Director, as well as chair of the IEEE Philadelphia Section and president of the IEEE Circuits and Systems Society (CAS). His awards include the AT&T Clinton Davisson Award, the IEEE CAS Darlington Award and Golden Jubilee Medal. Dr. Laker has contributed to four textbooks on microelectronic circuits, published more than 100 articles and holds six patents.

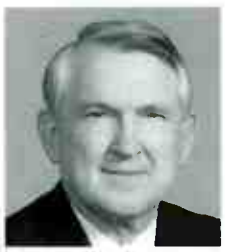
Richard M. Emberson, an IEEE staff member and volunteer for 23 years, personified the concept of dedicated service, particularly in the area of technical activities.

The award bearing his name recognizes distinguished service to the development, viability, advancement and pursuit of the technical objectives of the IEEE. It was established in 1986.

Sponsored by the IEEE Technical Activities Board, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Haraden Pratt Award

"For outstanding contributions to the Engineering Accreditation Activities of the IEEE."



Jerry R. Yeargan

Dr. Jerry R. Yeargan is widely known as a skillful and charismatic diplomat who excels at the art of creative compromise. He has demonstrated these qualities over a long and distinguished career of service, most recently as IEEE representative director on the Accreditation Board for Engineering and Technology (ABET) Board of Directors and as ABET president.

He played a seminal role in the merger of ABET and the Computer Science Accreditation Board, enabling unprecedented synergy in the accreditation of computer science, computer engineering and software engineering programs.

An IEEE Fellow, he has served on the IEEE Board of Directors as vice president of Educational Activities, and as president of the IEEE Education Society. Dr. Yeargan also has participated in numerous committees including the IEEE Strategic Planning Committee. He is a Fellow of the American Society for Engineering Education (ASEE) and former chair of the ASEE Electrical Engineering Division.

Dr. Yeargan's many honors include the IEEE Educational Activities Board Meritorious Service Award, the IEEE Education Society Achievement Award, the Arkansas Academy of Electrical Engineers Award, the Halliburton Outstanding Faculty Award and the University of Arkansas College of Engineering Outstanding Service to Students Award.

Dr. Yeargan is a Distinguished Professor and the Texas Instruments Chair of Mixed-Signal and Linear Microelectronics in Electrical Engineering at the University of Arkansas at Fayetteville, where he has taught since 1967. He holds one patent and has published more than 100 papers.

Haraden Pratt, IEEE Director Emeritus, gave more than three decades of dedicated service to the Board of Directors. He was president, treasurer and then secretary for 23 consecutive years. The award, established in his honor in 1971, is granted for outstanding service to the IEEE.

Sponsored by the IEEE Foundation, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Ernst Weber Engineering Leadership Recognition

"For leadership in revitalizing the semiconductor industry in Europe and increasing its influence worldwide."

Pasquale Pistorio

An inspirational leader in the European semiconductor industry, Mr. Pasquale Pistorio helped build what has become the world's sixth largest semiconductor company, STMicroelectronics N.V. (ST), in Geneva, Switzerland.

Throughout his tenure at ST, Mr. Pistorio has advocated the financial advantages of environmental protection and sustainable development. He is a member of the United Nations Information and Communications Task Force, which is dedicated to bridging the digital divide. His efforts have been pivotal to the renaissance of Catania, Sicily, in its move to become a leading European high-tech center. He serves as ST's president and CEO, and on the Boards of the Microelectronics for European Applications Association and the Joint European Sub-micron Silicon Initiative.

Mr. Pistorio launched his career in 1967 as Motorola's Marketing Director for Europe in Milan, Italy, rising to become general manager of Motorola's International Semiconductor Division in 1978. In 1980, he joined the SGS Group, an Italian microelectronics company, as chief executive officer. There, he championed the integration of SGS with France's Thomson Semiconducteurs and later, Britain's InMos, to form STMicroelectronics. At ST, he has guided the company to develop a diverse product portfolio based on high-growth applications and demonstrated an unshakable belief in, and financial support for, technological innovation.

Mr. Pistorio's awards include Italy's Cavaliere del Lavoro, France's Chevalier de la Legion d'Honneur and the Semiconductor Equipment and Materials International's first Akira Inoue Award for exceptional achievements in environment, health and safety. He has received honorary degrees from the Universities of Genova, Pavia, Malta and Catania.

Ernst Weber served in 1963 as the first president of the IEEE. His outstanding leadership as an engineering educator made him both a role model within the engineering community and a distinguished advocate for the profession.

The recognition bearing his name is granted for exceptional managerial leadership in the fields of interest to the IEEE. It was established in 1985.

Sponsored by the IEEE, the award consists of a certificate and crystal sculpture.

2004 IEEE Corporate Innovation Recognition

Hewlett-Packard Company

"For innovation of a total system of thermal inkjet printing technology and its mass commercialization."

Over the past three decades, Hewlett-Packard's (HP's) thermal inkjet (TIJ) technology has revolutionized the digital printing industry by providing a low cost, highly reliable and user friendly printing option for personal and business use. It has since become the first choice and universal standard for a wide range of new and pre-existing applications.

A number of seminal advances made TIJ printing on plain paper both possible and practical. But it was the replaceable print head/ink jet supply cartridge that established HP as the market leader for nearly 20 years. Ongoing technical innovation has allowed HP to drive TIJ performance up and cost down. The total number of drops/second ejected from a TIJ printer has increased at a compound annual growth rate of about 75 percent.

TIJ technology has allowed HP to retain 47 percent of the US$5.9 billion CAD and large format printing market, 51 percent of the US$28 billion personal desktop printing market and 70 percent of the US$50 billion professional business printing market. The company has consistently anticipated and created consumer demand for new products employing HP technology, notably for color and home digital photo printing.

hp invent

QUALCOMM Incorporated

"For innovation and leadership in code division multiple access (CDMA) technology for mobile wireless communications."

Since its founding in 1985, QUALCOMM has pioneered CDMA digital wireless technology, which makes effective use of the radio frequency spectrum to achieve far greater capacity gains than any other digital technology. Commercially introduced in 1995, CDMA quickly became one of the world's fastest-growing wireless technologies. In 1999, the International Telecommunications Union selected CDMA as the basis for 3G wireless systems. Today, more than 188 million users worldwide rely on CDMA.

Additionally, QUALCOMM has more than 3,000 issued and pending patents for CDMA and more than 125 telecommunications equipment manufacturers have been licensed for CDMA. Recent enhancements to CDMA2000 1xEV-DO provide operators with higher system capacity and the ability to offer users richer multimedia experiences and faster data rates. Wireless phones can now offer enhanced voice quality, high-speed Internet access, e-mail and a variety of multimedia applications. QUALCOMM's entire family of products and solutions is evolving to meet the need for such services, while continuing to enrich the overall wireless experience for consumers and businesses.

QUALCOMM

The IEEE Corporate Innovation Recognition is presented for outstanding and exemplary contributions by an industrial entity, governmental or academic organization, or other corporate body, which have resulted in major advancement of electrotechnology.

Sponsored by the IEEE, the award consists of a certificate and crystal sculpture.

2004 IEEE Cledo Brunetti Award

"For the invention and development of tools for nanoscale patterning, especially nanoimprint lithography, and for the scaling of devices into new physical regimes."

Stephen Y. Chou

Dr. Stephen Y. Chou's pioneering research on a broad variety of nanotechnologies and nanodevices has helped to shape new paths in the fields of nanofabrication, nanoscale electronics, optoelectronics, magnetics and materials. His graduate work used X-ray lithography to scale MOSFETs to the 60 nm range, and since 1984, he has demonstrated very small MOSFETs, single electron transistors, nanophotonic devices and nanomagnetic devices. His development of nanoimprint lithography (NIL) in 1994 gave rise to a revolutionary method that allows 10-nm patterning over large areas with high throughput and low cost, providing a key enabling tool for nanotechnology. An IEEE and Packard Fellow, Dr. Chou has published more than 280 papers and holds eight U.S. patents. His work has been cited over 3,000 times by other scientific journal papers. Since 1997, he has been the Joseph C. Elgin Professor of Electrical Engineering and head of the NanoStructure Laboratory at Princeton University in Princeton, New Jersey.

The IEEE Cledo Brunetti Award was established in 1975 through a bequest made by the late Cledo Brunetti, who was an executive of the FMC Corporation. The award is presented for outstanding contributions to miniaturization in the electronic arts.

Sponsored by the Brunetti Bequest, the award consists of a certificate and honorarium.

2004 IEEE Components, Packaging and Manufacturing Technology Award

"For lifetime contributions to tantalum film technology and the introduction of new electronic packaging technology to development and manufacturing."

John W. Balde

During his nearly 40-year tenure at Bell Telephone Laboratories and Western Electric in both the Princeton, New Jersey and Winston-Salem, North Carolina locations, John W. Balde contributed significantly to tantalum film hybrids, under-carpet cable technology and the introduction of advanced interconnect technology. A pioneering promoter of industry synergy, Mr. Balde led the globalization of surface-mount, multichip module (MCM) and advanced interconnect technologies, most notably through founding conferences and workshops, leading committees and task forces, and writing numerous publications. Founder of Interconnection Decision Consulting in Flemington, New Jersey, in 1981, Mr. Balde was a senior consultant there at the time of his death on 8 September 2003. An IEEE Life Fellow and a Fellow and Life Member of the International Microelectronics and Packaging Society (IMAPS), Mr. Balde's awards included the IEEE Third Millennium Medal and the IMAPS Hughes Award. He held 16 patents.

The IEEE Components, Packaging and Manufacturing Technology Award was established in 2002 to recognize meritorious contributions to the advancement of components, electronic packaging or manufacturing technologies. It is being presented for the first time in 2004.

Sponsored by the IEEE Components, Packaging and Manufacturing Technology Society, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Control Systems Award

"For fundamental contributions to the analysis and control of uncertain systems."

John Doyle

Dr. John Doyle has applied complex ideas of robust design and control to many fields and is now working on a unified theory of control in engineering, physics and biology. His innovative work strongly contributes to the human understanding of multi-variable systems, with implications well beyond his field. For nearly three decades, he has served as a consultant to Honeywell's Systems and Research Center in Minneapolis, Minnesota, and since 1986, he has been a professor of electrical engineering, bioengineering and control and dynamical systems at California Institute of Technology in Pasadena, California. An IEEE member, Dr. Doyle has received many awards including the IEEE W.R.G. Baker Prize Paper Award, two IEEE Control Systems Society George S. Axelby Outstanding Paper Awards and the IEEE Power Engineering Society Hickernell Prize Award. He holds two U.S. patents, and has published more than 30 works and co-authored two books.

The IEEE Control Systems Award was established in 1980 for outstanding contributions to control systems engineering, science, or technology.

The award consists of a bronze medal, certificate and honorarium, and is sponsored by the IEEE Control Systems Society.

2004 IEEE Herman Halperin Electric Transmission and Distribution Award

"For lightning research and its application to lightning protection of transmission lines and substations."

Andrew J. Eriksson

Dr. Andrew J. Eriksson has made fundamental contributions to the determination of transmission line lightning reliability and has had a leading role on related IEEE, IEC and CIGRE working groups for lightning studies. Dr. Eriksson's research at South Africa's National Electrical Engineering Laboratories, where he was chief research officer and later, assistant director from 1969 to 1985, helped clarify the parameters and striking processes of the ground flash as an engineering event. He developed equations and experimental data now used worldwide by the electric power industry. Dr. Eriksson is a Fellow of the IEEE, the IEE and the SAIEE. He has published over 40 papers and holds a patent as co-inventor of a lightning warning system. Recently retired after 16 years as a senior executive with global responsibilities in the international ABB Group, he lives in Switzerland and is an independent director and member of the board of The Performance Group in Oslo, Norway.

The IEEE Herman Halperin Electric Transmission and Distribution Award was established in 1986. Herman Halperin contributed to the design and operation of electric power plants and power cable systems during a distinguished 40-year career with the Commonwealth Edison Company.

Sponsored by the Robert and Ruth Halperin Foundation in Memory of Herman and Edna Halperin, the award is presented for outstanding contributions to electric transmission and distribution and consists of a certificate and honorarium.

2004 IEEE James L. Flanagan Speech and Audio Processing Award

"For fundamental contributions to the theory and practice of acoustic phonetics and speech perception."

Gunnar Fant and Kenneth N. Stevens

The field of speech research owes much to Dr. Gunnar Fant and Dr. Kenneth N. Stevens, who first collaborated in 1949 at the Massachusetts Institute of Technology (MIT) in Cambridge, Massachusetts. Dr. Fant has been instrumental in creating the multi-disciplinary area of speech communications and technology, while Dr. Stevens has pioneered the science and engineering of speech acoustics, production, perception and processing. Their textbooks—Dr. Fant's "Preliminaries to Speech Analysis" (co-authored by Roman Jakobson and Morris Halle) and "Acoustic Theory of Speech Production" and Dr. Stevens' "Acoustic Phonetics" —remain definitive speech processing texts.

Dr. Fant is professor emeritus in what is now the Department of Speech, Music and Hearing at Stockholm's Royal Institute of Technology (KTH). He is a member of the U.S. National Academy of Engineering, the American Academy of Arts and Sciences, the Royal Swedish Academy of Engineering Science and the Royal Swedish Academy of Science. Dr. Fant is a Fellow of the Acoustical Society of America, and other honors include the Swedish Academy of Engineering Sciences' gold medal and the Ericsson prize in telecommunication (shared with James Flanagan).

Dr. Stevens is the Clarence J. LeBel Professor of Electrical Engineering and Computer Science and head of the Research Laboratory of Electronics Speech Communication Group at MIT. He also is a consultant to Sensimetrics Corporation in Somerville, Massachusetts. An IEEE Life Fellow, he is a Fellow of the American Academy of Arts and Sciences, and a member of the U.S. National Academy of Engineering and the U.S. National Academy of Sciences. A Fellow and past president of the Acoustical Society of America, Dr. Stevens has received that society's gold medal and the U.S. National Medal of Science.

Well known to the IEEE, Dr. James L. Flanagan has spent his life's work in the fields of speech and audio acoustics. In 2002, the IEEE James L. Flanagan Speech and Audio Processing Award was established in his honor. The award is being presented for the first time in 2004. It recognizes an outstanding contribution to the advancement of speech and/or audio signal processing.

Sponsored by the IEEE Signal Processing Society, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Reynold B. Johnson Information Storage Award

"For key technical contributions to the development of spin valve giant magnetoresistive recording heads for computer data storage devices."

Virgil S. Speriosu and Bruce A. Gurney

Dr. Virgil S. Speriosu and Dr. Bruce A. Gurney collaborated on the development of the spin valve while at IBM's Almaden Research Center in San Jose, California. A practical giant-magnetoresistive (GMR) readback sensor, the spin valve has phenomenally extended the capacity and performance of disk drives. Since its commercial introduction in a hard drive in 1997, it has displaced all other detection systems for high-density magnetic disk storage. Related technology is used in all disk drives manufactured today. The resulting increases in data storage capacity have been essential to the establishment and growth of the Internet.

Dr. Speriosu joined IBM's Almaden Research Center in 1984. He was named manager of magnetic thin films in 1989, and manager of thin films for recording heads in 1994. He has contributed to the study of ferromagnetic phenomena at numerous institutions around the world. In 1997, he became vice president of wafer development at Applied Magnetics Corporation in Goleta, California, where he worked until his retirement in 1999. An IEEE member, his awards include the International Union of Materials Research Societies Award for New Materials and the IBM Corporation Outstanding Technical Achievement Award. The author or co-author of more than 65 publications, he holds 21 patents on spin valve devices.

Dr. Gurney worked at IBM's Almaden Research Center from 1987 to 2002, serving as staff engineer/scientist, advisory engineer/scientist for the storage systems product division, research staff member and finally manager of the thin film magnetism group. An IEEE Member, he serves on the IEEE Magnetics Society Advisory Committee. A Fellow of the American Physical Society and recipient of the IBM Corporation Outstanding Technical Achievement Award, he has written more than 36 papers on magnetic recording technologies and holds more than 25 patents. Dr. Gurney currently manages the recording head and nanostructure materials group at the San Jose Research Center of Hitachi Global Storage Technologies.

The IEEE Reynold B. Johnson Information Storage Award was established in 1991 for outstanding contributions to information storage, with emphasis on computer storage. It is named in honor of Reynold B. Johnson, who is renowned as a pioneer of magnetic disk technology, and in 1952, was founding manager of the IBM San Jose Research and Engineering Laboratory, where IBM research and development in the field was centered.

Sponsored by IBM Almaden Research Center, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Andrew S. Grove Award

"For seminal contributions to silicon process technology."

Krishna C. Saraswat

Demonstrating visionary leadership for more than 30 years, Dr. Krishna C. Saraswat's influence extends from fundamental research of silicon oxidation to system-level studies of wiring delays and chip performance. He has made fundamental contributions to device structures, new materials, and process technology of silicon devices and integrated circuits. These contributions have helped in continued scaling of device dimensions and improvement in the performance of integrated circuits. An IEEE Fellow and member of the Electrochemical and the Materials Research Societies, Dr. Saraswat has received the Electrochemical Society's Thomas D. Callinan Award and two gold medals for undergraduate excellence from the Birla Institute of Technology and Science in Pilani, India. He is the author or co-author of more than 400 technical papers. Dr. Saraswat has been a professor of electrical engineering at Stanford University in Stanford, California since 1983. He also holds the Rickey/Nielsen Professorship of Engineering at Stanford and is the associate director of the National Science Foundation/ Semiconductor Research Corporation Engineering Research Center there for Environmentally Benign Semiconductor Manufacturing.

The IEEE Andrew S. Grove Award was established in 1999. It replaced the IEEE Jack A. Morton Award. The award is presented for outstanding contributions to solid-state devices and technology.

Sponsored by the IEEE Electron Devices Society, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Electromagnetics Award

"For contributions to fundamental electromagnetic theory and its advanced applications, especially to remote sensing and geophysical probing."

Jin Au Kong

Dr. Jin Au Kong's impact on electromagnetics research and education has been monumental. His work on microwave remote sensing, particularly the development of coherent transport techniques for both active and passive remote sensing problems revolutionized applications such as microstrip antennas, geophysical probing, superconductivity, EMC/EMI design, microwave circuits and rough surface scattering. He is the primary organizer of the Progress in Electromagnetics Research Symposium, a key discussion forum for electromagnetic research. A Fellow of the IEEE and the Optical Society of America, Dr. Kong has published more than 30 books, and more than 600 refereed journal articles, book chapters and conference papers. His awards include the S.T. Li Prize and the IEEE Geoscience and Remote Sensing Society's Distinguished Achievement Award. A professor of electrical engineering and computer science at the Massachusetts Institute of Technology in Cambridge, Massachusetts since 1969, he is editor for the Wiley series on remote sensing and the *Journal of Electromagnetic Waves and Applications*.

The IEEE Electromagnetics Award was established in 1996 to recognize outstanding contributions to electromagnetics in theory, application or education.

Sponsored by the IEEE Antennas and Propagation, IEEE Microwave Theory and Techniques, IEEE Electromagnetic Compatibility and IEEE Geoscience and Remote Sensing Societies, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Masaru Ibuka Consumer Electronics Award

"For major contributions to digital audio source coding."

Karlheinz Brandenburg

Dr. Karlheinz Brandenburg has been a driving force behind some of today's most innovative digital audio technology, notably the MP3 and MPEG audio standards. He is acclaimed for seminal work on digital audio coding and perceptual measurement techniques, wave field synthesis (WFS) and psycho-acoustics. An IEEE Senior Member, Dr. Brandenburg serves on the IEEE Signal Processing Society's Technical Committee on Audio and Electro-acoustics and is a Fellow of the Audio Engineering Society (AES). His honors include the IEEE Region 10 Engineering Excellence Award, the AES Silver Medal and German Future Award, which he shared with colleagues. The author of numerous articles and co-editor of *Applications of Digital Signal Processing to Audio and Acoustics*, Dr. Brandenburg holds 25 patents, with several more pending. He is professor and head of the Institute for Media Technology at Ilmenau Technical University, and director of the Fraunhofer Institute for Digital Media Technology IDMT, both in Ilmenau, Germany.

Co-Founder of the Sony Corporation, Dr. Masaru Ibuka guided many aspects of the ongoing consumer electronics revolution. His innovations and leadership in consumer electronics technology consistently redefined the state of the art and inspired generations of electrical, electronics and computer engineers.

Established in 1986, the IEEE Masaru Ibuka Consumer Electronics Award recognizes outstanding contributions in the field of consumer electronics technology. Sponsored by the Sony Corporation, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Award in International Communication

"For extraordinary contributions and leadership in the development of international data communication systems and standards, and for fostering international cooperation."

Victor B. Lawrence

A pioneer in the application of digital signal processing concepts and techniques to data communications, Dr. Victor B. Lawrence has made seminal contributions to the evolution of voice-band modems, digital subscriber line technology and broadband transmission. His work on V-series modem technology and international standards paved the way for worldwide Internet access and made high-speed data communication over international networks possible. He has served on the IEEE Fellow Committee, as editor-in-chief of *IEEE Transactions on Communications*, as chair of the IEEE Awards Board and on the IEEE Communications Society Board of Governors. An IEEE Fellow, his many awards include the IEEE Third Millennium Medal, the IEEE Circuits and Systems Society's Guillemin-Cauer Prize Award and an Emmy Award. A member of the U.S. National Academy of Engineering and an AT&T Bell Laboratories Fellow, Dr. Lawrence is vice president of Lucent Technologies' Advanced Communications Technology Center in Holmdel, New Jersey.

Established in 1966, the IEEE Award in International Communication honors outstanding contributions to international communications.

Sponsored by British Telecom, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Internet Award

"For their key roles in the conceptualization, first implementation, and standardization of network email."

Raymond Tomlinson and David H. Crocker

In 1971, Mr. Raymond Tomlinson was a developer of the TENEX time-sharing system, popular among computer science departments attached to the fledgling ARPANET, when he pioneered the network messaging system known today as email. Many aspects of his first email persist today—most notably his choice of the "@" symbol to separate user and computer names. He also made early contributions to protocols that are the basis for Internet communication—the three-way handshake of the TCP protocol has its roots in his "Selecting Sequence Numbers" paper. A Senior Member of the IEEE, Mr. Tomlinson has received many awards including induction into the Rensselaer Polytechnic Institute Alumni Hall of Fame. He is principal engineer at Bolt, Beranek and Newman in Cambridge, Massachusetts, where he has been employed since 1967.

Mr. David H. Crocker has been a vital contributor to email standards development since the early 1970s. The author of more than 45 Requests for Comments (RFC), his work includes RFC 733—the first standard for Internet email—and its revision, RFC 822, which remains the core reference for Internet mail formatting. He also has played a major role in the development of standards for MIME file attachments, Internet facsimile and Internet electronic data interchange, as well as contributing to work on network management, domain name service and transport protocol service optimizations. Active in a number of influential standards groups, Mr. Crocker also was an architect of mail systems including OSI's X.400 and MCI Mail. Since 1991, he has been a principal at Brandenburg InternetWorking. A Senior Member of the IEEE, Mr. Crocker also is a member of the Association of Computing Machinery, the Internet Society and the Independent Computer Consultants Association.

The IEEE Internet Award was established in 1999 for exceptional contributions to the advancement of internet technology for network architecture, mobility and/or end-use applications.

The award, sponsored by Nokia Corporation, consists of a bronze medal, certificate and honorarium.

2004 IEEE Richard Harold Kaufmann Award

"For outstanding contributions to the understanding of electric motor applications through technical writings, presentations and teaching."

Richard L. Nailen

Over the past four decades, Mr. Richard L. Nailen has been without peer in advancing the understanding and proper application of electric motors. A longtime contributor to, and now engineering editor of, *Electrical Apparatus* magazine, he is the author of more than 450 articles on motor design and applications, and several classic reference books. He is known as an expert in communicating technical information clearly and concisely, and has presented numerous university extension courses, seminars and workshops. An IEEE Life Fellow, Mr. Nailen is a member emeritus of the IEEE Industry Applications Society Petroleum and Chemical Industry Committee (PCIC), the PCIC Working Group for P1566 and the PCIC Papers Review, Refining and Safety Subcommittees. He is the author of several prize-winning papers and has served on many IEEE and Industrial and Commercial Power Systems committees and subcommittees. In 1995, Mr. Nailen retired as project engineer from Wisconsin Electric Power Co. in Milwaukee, Wisconsin.

Established in 1986, the IEEE Richard Harold Kaufmann Award is presented for outstanding contributions in industrial systems engineering.

Sponsored by the IEEE Industry Applications Society, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Joseph F. Keithley Award in Instrumentation and Measurement

"For fundamental contributions to electrical measurements, with particular emphasis on the development of impedance bridges and standards, and the application of microprocessors to impedance measurement science."

Henry P. Hall

Mr. Henry P. Hall worked for 40 years in the instrumentation field and made significant contributions to the advancement of low-frequency impedance measurements and impedance standards. Instrumental in the development of more than 16 bridges and meters, Mr. Hall may be best known for pioneering the method used in the Digibridge© line of microprocessor-based impedance meters, patented in 1976. This microprocessor technology allowed users to develop dramatically less expensive instruments that increased speed, versatility and accuracy. Equipment drawing on his work remains widely used in the electrical and electronic industries today. A Life Fellow of the IEEE and one of only three General Radio (GenRad) Fellows, Mr. Hall has been a very active member of the IEEE Instrumentation and Measurement Society. He holds eight patents and has published more than 40 articles. He retired from GenRad, Inc. (now part of Teradyne) in Concord, Massachusetts, as senior staff scientist in 1992.

The IEEE Joseph F. Keithley Award in Instrumentation and Measurement was established in 2000 to honor Joseph F. Keithley, founder of Keithley Instruments, Inc., whose principles of "quality, service, innovation and integrity" are still carried out today. Presented for the first time in 2004, the award recognizes outstanding contributions in electrical measurements.

Sponsored by Keithley Instruments, Inc., the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Leon K. Kirchmayer Graduate Teaching Award

"For his pioneering contributions to graduate education and curriculum development."

Simon Haykin

A professor of electrical and computer engineering at McMaster University in Hamilton, Ontario, Canada for nearly 40 years, Dr. Simon Haykin is a noted authority on adaptive and learning systems. He has pioneered signal-processing techniques and systems for radar and communication applications, and written several fundamental textbooks in those fields. From 1972 to 1993, he served as founding director of McMaster's Communications Research Laboratory. Continually developing new curricula, Dr. Haykin has created innovative courses in emerging fields: neural networks, Bayesian sequential state estimation and space-time communication theory. He has often ceded lead authorship to his students and has fostered their career development through industrial collaboration. An IEEE Life Fellow and a Fellow of The Royal Society of Canada, Dr. Haykin has received the IEEE Signal Processing Society Education Award, the IEEE Education Society McGraw-Hill/Jacob Millman Award, the IEEE Region 7 McNaughton Gold Medal and the International Union of Radio Science's Booker Gold Medal.

The IEEE Graduate Teaching Award was established in 1990 and renamed in honor of Leon K. Kirchmayer in 2002. Dr. Kirchmayer was well known and revered throughout the world for his commitment to students and education.

This award honors teachers for inspirational teaching of graduate students in the IEEE fields of interest. Sponsored by the Leon K. Kirchmayer Memorial Fund, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Daniel E. Noble Award

"For his pioneering work and sustained development of the Digital Micromirror Device, used in projection displays."

Larry J. Hornbeck

Dr. Larry J. Hornbeck, an employee of Texas Instruments since 1973, and a TI Fellow, invented the Digital Micromirror Device (DMD) in 1987 and led its development. A microchip that enables all-digital, source-to-eye projection, the DMD revolutionized projection displays. Thanks to its small size; high brightness; and exceptional image fidelity, stability and reliability, many of the world's top display manufacturers market projectors and big-screen TVs based on the DMD microchip for conference rooms, home entertainment, large venues and digital cinema. An IEEE Member and International Society for Optical Engineering (SPIE) Fellow, Dr. Hornbeck has received numerous awards, including an Emmy from the Academy of Television Arts & Sciences, and the David Sarnoff Medal Award from the Society of Motion Picture and Television Engineers. The author or co-author of 27 publications, Dr. Hornbeck holds 32 U.S patents.

The IEEE Daniel E. Noble Award was established in 2000 for outstanding contributions to emerging technologies recognized within recent years. The award is named in honor of Dr. Daniel E. Noble, Executive Vice Chairman of the Board Emeritus of Motorola. Dr. Noble is known for the design and installation of the U.S.'s first statewide two-way radio communications system, which was the first in the world to use FM technology.

Sponsored by Motorola Foundation, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Frederik Philips Award

"For leadership in developing state-of-the-art logic technologies for high performance/high volume general purpose microprocessors."

Youssef A. El-Mansy

A longtime trailblazer in the field of microprocessors, Dr. Youssef A. El-Mansy has led the way in developing innovative yet manufacturable technologies. Thanks to his leadership, first as group vice president and now as corporate vice president and director of logic technology development, Intel has risen to the top of its field and the semiconductor technology cycle has accelerated from three years to two. Since he joined Intel Corporation in Hillsboro, Oregon in 1979, Dr. El-Mansy has led the development of logic technology from 1-micron through 0.065 microns. He is primarily responsible for the "copy exactly" methodology, which enables high-yielding production ramps of new semiconductor processes at multiple sites at unprecedented rates. An IEEE Fellow, Dr. El-Mansy has served the IEEE Electron Devices Society (EDS) on numerous committees and is on the EDS VLSI Symposia Executive Committee. He has published over 30 papers.

The IEEE Frederik Philips Award was established in 1971 through an agreement between N.V. Philips' Gloeilampenfabrieken and the IEEE. It is presented for outstanding accomplishments in the management of research and development resulting in effective innovation in the electrical and electronics industry.

Sponsored by Philips Electronics N.V., the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Photonics Award

"For leadership, vision, and pioneering contributions in the fields of optical fiber communications and laser science."

Tingye Li

Dr. Tingye Li's seminal contributions to lightwave technologies span more than four decades. After joining AT&T Bell Labs in Holmdel, New Jersey in 1957, he worked with Gardner Fox on laser resonator modes. Their work has been fundamental to the theory and practice of lasers. He is a pioneering leader in lightwave system research and is credited with revolutionizing lightwave communications by advocating and leading the research on amplified wavelength–division-multiplexed transmission systems at AT&T. Dr. Li retired from AT&T in 1998, as a division manager in the Communications Infrastructure Research Laboratory. He is currently an independent consultant in lightwave technologies and systems. An IEEE Life Fellow, he is a member of the U.S. National Academy of Engineering and the Chinese Academy of Engineering, and a fellow of the Optical Society of America (OSA). Dr. Li has received the IEEE David Sarnoff Award, the IEEE W.R.G. Baker Prize Paper Award and the OSA/IEEE John Tyndall Award.

The IEEE Photonics Award was established in 2002. It recognizes outstanding achievements in photonics and is being presented for the first time in 2004.

Sponsored by the IEEE Lasers and Electro-Optics Society, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Emanuel R. Piore Award

"For seminal contributions to the theory and practice of concurrent programming and fault-tolerant computing."

Leslie Lamport

Dr. Leslie Lamport's pioneering work has profoundly shaped the way we think about distributed systems today. His treatment of concurrency, which encompasses fault tolerance and distribution, can be applied to the design of almost any computer system. His work on a suite of widely used algorithms includes the groundbreaking general algorithm for Byzantine consensus and the Paxos algorithm for consensus in asynchronous systems with omission faults. His contributions to the verification of concurrent systems include introducing the concepts of safety and liveness in the late 1970s. Dr. Lamport is a member of the U.S. National Academy of Engineering and the author of about 100 publications including two books, "Specifying Systems: The TLA+ Language and Tools for Hardware and Software Engineers" and "LaTeX: A Document Preparation System." He is a senior researcher of Microsoft Research's Silicon Valley Laboratory in Mountain View, California.

The IEEE Emanuel R. Piore Award was established in 1976 for outstanding contributions in the field of information processing in relation to computer science.

Sponsored by the IEEE Emanuel R. Piore Award Fund, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Judith A. Resnik Award

"For significant contributions to the development and application of spaceborne microwave radiometry to remote sensing."

Anthony W. England

Dr. Anthony W. England is a renowned authority on radiometric remote sensing from space and has made numerous contributions to the field. These include the theory of scatter darkening of microwave brightness in snow, ice and frozen soil; model-based recovery of soil moisture; synthetic thinned-array radiometers for future spaceborne soil moisture missions; and a novel direct-sampling digital radiometer. An IEEE Fellow, he has served as associate editor of the *Journal of Geophysical Research* and on the National Research Council's Space Studies Board. Dr. England was a NASA scientist astronaut during the Apollo missions and the early shuttle program, and worked for the U.S. Geological Survey, spending two field seasons in Antarctica. Since 1988, he has held a joint appointment as professor of electrical engineering and computer sciences (EECS) and of atmospheric, oceanic and space sciences at the University of Michigan at Ann Arbor, where he is associate chair of EECS. He has published more than 100 journal and proceedings papers.

The IEEE Judith A. Resnik Award was established in 1986 to recognize outstanding contributions to space engineering, within the fields of interest of the IEEE. The award is named in honor of IEEE Member Judith Resnik, who was a mission specialist on the NASA Space Shuttle Challenger.

Sponsored by the IEEE Aerospace and Electronic Systems, IEEE Control Systems and the IEEE Engineering in Medicine and Biology Societies, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Robotics and Automation Award

"For a lifetime of achievement in establishing and advancing the field of robotics and automation worldwide."

Joseph F. Engelberger

Widely hailed as the father of industrial robotics, Mr. Joseph F. Engelberger possesses a rare vision of robots' potential to help humanity and has worked tirelessly to make that vision a reality. In 1961, Mr. Engelberger founded the groundbreaking industrial robot company, Unimation Inc. in Danbury, Connecticut, where he served as president and director until its 1983 sale to Westinghouse Electric Company. He next founded HelpMate Robotics Inc., also in Danbury, which developed the first successful service robot. Retired as chairman in 1999, Mr. Engelberger is working on a robot that would assist elderly and infirm individuals. A member of the U.S. National Academy of Engineering, Mr. Engelberger has received the Japan Prize, the American Society of Mechanical Engineers' Leonardo da Vinci Award and Columbia University's Egleston Medal. He has written numerous articles and books, including "Robotics in Practice" and "Robotics in Service."

Established in 2002, the IEEE Robotics and Automation Award is being presented for the first time in 2004. It recognizes contributions in the field of robotics and automation.

Sponsored by the IEEE Robotics and Automation Society, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE David Sarnoff Award

"For his key role in the development of high efficiency transparent substrate light emitting diodes and their commercial realization."

Frederick A. Kish, Jr.

A trailblazer in the design and fabrication of ultra-high brightness LEDs, Dr. Frederick A. Kish, Jr. developed revolutionary designs and processes for LEDs utilizing direct wafer bonding to cost-effectively increase their luminous efficiency. This advance spearheaded the introduction of solid-state lighting in many applications. At Hewlett-Packard Company in Palo Alto, California, Dr. Kish successfully led the commercial introduction of high-efficiency wafer-bonded transparent-substrate AlGaInP LEDs. Now produced by LumiLeds Lighting, an Agilent/HP/Philips Lighting joint venture, they have become the dominant technology in red, orange and yellow automotive, traffic and power signaling. An IEEE Senior Member, Dr. Kish has received the IEEE Lasers and Electro-Optics Society Engineering Achievement Award and the Optical Society of America's Adolph Lomb Medal. He holds more than 30 U.S. patents and has co-authored more than 45 papers. He serves as vice president of development and manufacturing for Infinera in Sunnyvale, California.

The IEEE David Sarnoff Award was established in 1959 through an agreement between the RCA Corporation and the American Institute of Electrical Engineers, and continued by the IEEE. The Sarnoff Corporation assumed sponsorship in 1989.

The award consists of a bronze medal, certificate and honorarium and is presented for exceptional contributions to electronics.

2004 IEEE Solid-State Circuits Award

"For pioneering contributions to low-power device modeling and CMOS circuit design."

Eric A. Vittoz

A renowned expert in low-power CMOS circuit design, Dr. Eric A. Vittoz also is recognized for his groundbreaking work with miniature electronic devices. His contributions at Centre Electronique Horloger (CEH) in Neuchâtel, Switzerland in the early 1960s advanced the development of the first electronic wristwatch.

His work has fueled innovations including low-voltage CMOS logic; circuits based on MOS transistors operated in weak inversion as bipolars and as pseudo-resistors, and biology-inspired processing. With colleagues at CEH and the Swiss Federal Institute of Technology (EPFL) in Lausanne, he developed a MOS model for low-current and low-voltage circuit design known as the EKV model. His work has been applied to a wide range of battery-operated instruments.

Dr. Vittoz is a Research Fellow at the Swiss Center for Electronics and Microtechnology in Neuchâtel and a professor at EPFL. An IEEE Fellow, he has published more than 130 papers and holds 26 patents.

Benefits to society, enhancements to technology and professional leadership are the hallmarks of the IEEE Solid-State Circuits Award. The award was established in 1987 for outstanding contributions to solid-state circuits.

The award is sponsored by the IEEE Solid-State Circuits Society, and consists of a bronze medal, certificate and honorarium.

2004 IEEE Charles Proteus Steinmetz Award

"For outstanding contributions to the development of standards in the nuclear power industry, and for sustained, innovative leadership in the IEEE standards development process."

Julian Forster

For more than three decades, Mr. Julian Forster has worked to develop standards for the nuclear power industry and promote the IEEE as a key standardization organization. A proponent of applying computers to the standards process, Mr. Forster chaired the IEEE Standards Board from 1969 to 1971 and is one of only two Members Emeriti. His work on IEEE Standard 279 now IEEE Standard 603, Criteria for Protection Systems for Nuclear Power Generating Stations, was integral to establishing safety system requirements for these facilities. An IEEE Life Fellow, Mr. Forster is a member of the IEEE Computer, Power Engineering and Nuclear and Plasma Sciences (NPSS) Societies. He has received the IEEE USA Professional Achievement Award, the IEEE Standards Board Distinguished Service Award, the IEEE Third Millennium Medal and the IEEE NPSS Richard F. Shea Distinguished Member Award. Since 1996 he has served as a consultant for General Electric Nuclear Energy in San Jose, California.

Charles Proteus Steinmetz's theories were essential to the development of universal electrical systems, making him the first true theoretician of alternating-current electrical systems. He was also active in the AIEE, serving as president in 1901 and 1902. Established in 1979, the IEEE Charles Proteus Steinmetz Award is presented for exceptional contributions to the development of standards in electrical and electronics engineering.

Sponsored by the IEEE Standards Association, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Eric E. Sumner Award

"For innovation and outstanding contributions to communications theory, in particular on multi-element antenna technology for high spectral-efficiency communications."

Gerard J. Foschini

Over the past four decades, Dr. Gerard J. Foschini greatly impacted communications theory and engineering, most notably through his work on layered, spacetime multi-antenna systems. Such techniques, which allow unprecedented levels of spectral efficiency, are being applied to wireless LAN (Wi-Fi) systems and are being proposed in the next-generation mobile wireless communication systems. An IEEE Fellow, Dr. Foschini has won the Lucent Inventor's Award and the Research and Development Council of New Jersey's Thomas Alva Edison Patent Award. He is a Bell Labs Fellow and past recipient of the Bell Labs Inventor's Award, Gold Award and Teamwork Award. With 100 published papers, including seminal works on optical communications and resource allocation for both computer networks and wireless systems, he holds seven patents and has six pending. Dr. Foschini is a Distinguished Member of Staff and a Distinguished Inventor at Bell Laboratories in Holmdel, New Jersey, where he has worked since 1961.

Distinguished engineer Eric E. Sumner retired as Vice President of AT&T Bell Labs after decades of notable contributions to communications technology. He was the president of the IEEE in 1991. Established in 1995, the IEEE Eric E. Sumner Award is presented for outstanding contributions to communications technology.

Sponsored by Lucent Technologies, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Nikola Tesla Award

"For pioneering and outstanding contributions to transient finite element computation of electric machines coupled to electronic circuits; and electromechanical devices."

Sheppard J. Salon

Dr. Sheppard J. Salon is a trailblazer in the application of numerical techniques to the design and operation of electrical machines. His reach extends far into the art of coupling finite element code to lumped parameter electric and mechanical differential equations. In his research and teaching, he has improved field models for perplexing magnetic and thermal problems and extended finite element analysis to incorporate motion, thermal and acoustic phenomena and interactions with external circuits. An IEEE Fellow, Dr. Salon is an editor of *IEEE Transactions on Magnetics* and a former chairman of the IEEE Power Engineering Society Synchronous Machines Subcommittee. He has written two books, "Finite Element Analysis of Electric Machines" and "Numerical Methods in Electromagnetism," and numerous IEEE transactions papers. He is a professor in the Electrical, Computer and Systems Engineering Department of Rensselaer Polytechnic Institute, and also the president and CEO of Magsoft Corporation, both in Troy, New York.

The IEEE Nikola Tesla Award was established in 1975. It is sponsored by the IEEE Power Engineering Society and is presented for outstanding contributions to the generation and utilization of electric power.

The Award is named in honor of Nikola Tesla, an electrical engineer, inventor and a pioneer in many fields, who is most renowned for the development of the coil that bears his name and the ac induction motor. The award consists of a plaque and honorarium.

2004 IEEE Kiyo Tomiyasu Award

"For outstanding contributions to the science and technology of computational intelligence and to the development and expansion of that field."

David B. Fogel

A pioneer in evolutionary programming, Dr. David B. Fogel has helped develop important theoretical foundations and applications ranging from signal processing to weapons launch sequence planning to pharmaceutical design. In his best-known academic work, Blondie24, a computer taught itself to play checkers competitively with human experts. He has produced more than 200 publications in the field, notably "Evolutionary Computation: Toward a New Philosophy of Machine Intelligence." He served as the founding editor-in-chief of the *IEEE Transactions on Evolutionary Computation* and now serves as the IEEE/Wiley series editor on computational intelligence. Dr. Fogel holds one U.S. patent for hardware design for evolutionary optimization of a neural network. An IEEE Fellow, he serves on the Editorial Board of *Proceedings of the IEEE* and as vice president of publications for the IEEE Neural Networks Society. Dr. Fogel is the CEO and co-founder of Natural Selection, Inc., in La Jolla, California.

The IEEE Kiyo Tomiyasu Award was established in 2000. The award is presented for outstanding early to mid-career contributions to technologies holding the promise of innovative applications.

Sponsored by the Kiyo Tomiyasu Fund, the award consists of a bronze medal, certificate and honorarium.

2004 IEEE Undergraduate Teaching Award

"For excellence in undergraduate teaching and development of outstanding textbooks for courses in microelectronics."

Richard C. Jaeger

Distinguished University Professor and Electronics Stem Chair at Auburn University in Alabama, Dr. Richard C. Jaeger has been a leader in curriculum development since 1979. As interim director of Wireless Engineering at Auburn, he led the development of the new Bachelor of Wireless Engineering degree program at the school. Dr. Jaeger championed the development of Auburn's Alabama Microelectronics Science and Technology Center, a site that allows undergraduates hands-on fabrication experience. His microelectronic fabrication and circuit design textbooks are widely used throughout the world. An IEEE Fellow, Dr. Jaeger is vice president of the IEEE Solid-State Circuits Society and has served as the IEEE Solid-State Circuits Council president and editor of the *IEEE Journal of Solid-State Circuits*. He has published more than 200 technical papers and articles. Dr. Jaeger's awards include the IEEE Computer Society's Outstanding Contribution Award and Golden Core Recognition, the IEEE Third Millennium Medal, and the IEEE Education Society McGraw-Hill/Jacob Millman Award.

The IEEE Undergraduate Teaching Award was established in 1990 and recognizes inspirational teaching of undergraduate students in the fields of interest of IEEE.

Sponsored by the IEEE Foundation, the award consists of a bronze medal, certificate and honorarium.

IEEE PRIZE PAPER AWARD

2004 IEEE Donald G. Fink Prize Paper Award

***"Multiresolution Markov Models for Signal and Image Processing," Proceedings of the IEEE,* Volume 90, No. 8, August 2002, pages 1396-1458.**

Alan S. Willsky

"Multiresolution Markov Models for Signal and Image Processing" by Dr. Alan S. Willsky is a comprehensive overview of multi-resolution (MR) modeling. Describing a framework for processing signals and images, it provides a coherent description of MR methods, concepts, and applications. An IEEE Fellow, Dr. Willsky has held leadership positions in the IEEE Control Systems Society, of which he is a Distinguished Member. His honors include the IEEE Browder J. Thompson Memorial Prize Paper Award and the American Society of Civil Engineers' Alfred Noble Prize. He is the author of two books, notably "Signals and Systems" (co-authored with Alan Oppenheim), and has published approximately 170 journal and 300 conference papers. Dr. Willsky is the Edwin Sibley Webster Professor of Electrical Engineering at the Massachusetts Institute of Technology in Cambridge, Massachusetts, where he has taught since 1973, as well as a founder, board member and Chief Scientific Consultant of Alphatech, Inc. in Burlington, Massachusetts.

Donald G. Fink, Director Emeritus of the IEEE, was the IEEE's first General Manager and Executive Director. A distinguished editor and author, he also served as the President of the IRE.

Established in 1979, the IEEE Donald G. Fink Prize Paper Award recognizes the most outstanding survey, review, or tutorial paper published during the previous year in the transactions, journals, and magazines of the IEEE Societies, or in the Proceedings of the IEEE.

Sponsored by the IEEE Life Members Committee, the award consists of a certificate and honorarium.

The grade of IEEE Fellow recognizes unusual distinction in the profession and is conferred only by invitation of the IEEE Board of Directors upon a person with an extraordinary record of accomplishments in any of the IEEE fields of interest. The accomplishments that are being honored shall have contributed importantly to the advancement or application of engineering, science and technology, bringing the realization of significant value to society. The total number of IEEE Fellows elected in any one year must not exceed one-tenth percent of the total voting membership of the IEEE on record as of 31 December of the preceding year. In 2004, 260 IEEE Fellows were elected. If you would like to learn more about the IEEE Fellow Program or would like to nominate an individual, please visit www.ieee.org/fellows.

Alejandro Acero
For contributions to noise robust speech recognition and speech technology education.

Shirabe Akita
For contributions in applied superconductivity in support of electric power applications.

Jan I.H. Askne
For contributions to microwave remote sensing applications and education.

Les Eugene Atlas
For contributions to time-varying spectral analysis and acoustical signal processing.

Er-Wei Bai
For contributions to system identification and parameter estimation.

Harbans L. Bajaj
For leadership in field management of power plants.

Wamadeva Balachandran
For contributions to the understanding of electro-hydrodynamic atomization of liquids.

Gary J. Balas
For contributions to robust control techniques for aerospace vehicles.

Miroslav Miodrag Begovic
For leadership in developing analysis tools and protection techniques for electric power transmission systems and renewable generation.

Jerome R. Bellegarda
For contributions to statistical methods for human language processing.

Jon Atli Benediktsson
For contributions to pattern recognition and data fusion in remote sensing.

Nihat Bilgutay
For leadership in engineering education innovation.

Chatschik Bisdikian
For contributions to the development, modeling, and analysis of communication protocols and wireless personal area networks.

Jerome John Blair
For contributions to the design and testing of analog to digital converters.

Mark Thomas Bohr
For leadership in advancing CMOS logic technologies.

Piero P. Bonissone
For leadership in the development of artificial and computational intelligence technologies and their applications to real-world problems.

Kim Boyer
For contributions to computer vision.

Thomas Joseph Brazil
For contributions to circuit level modeling of non-linear devices.

Kevin Francis Brennan
For contributions to the modeling of impact ionization in heterostructures and multiquantum well structures.

Gary B. Bronner
For contributions to dynamic random access memory technology.

Michael Jesse Buckler
For contributions to optical communications technology and engineering education.

James Antonio Bucklew
For contributions to applications of signal quantization.

Constantin Bulucea
For contributions to transistor engineering in the area of power electronics.

Yan Cheong Chan
For contributions to electronic product reliability.

Rajen Chanchani
For contributions to advanced packaging technologies.

Anantha P. Chandrakasan
For contributions to the design of energy efficient integrated circuits and systems.

Venkatachalam Chandrasekar
For contributions to quantitative remote measurement and classification of precipitation.

Cheng-Shang Chang
For contributions to the theory of providing performance guarantees in communication networks.

Dau-Chyrh Chang
For technical leadership in antenna design and measurement systems.

Shih-Fu Chang
For contributions to digital video and multimedia technologies.

Hsing-Yao Chen
For contributions to electron gun design for color cathode ray tubes.

Ming-Syan Chen
For contributions to algorithms for query processing and data management in parallel and distributed systems.

Ray T. Chen
For contributions to polymer-based guided devices for optical interconnects.

Xuemin Chen
For contributions to video coding standardization and its implementation for satellite and cable communication systems.

Edwin Chong
For contributions to communication networks and discrete event systems.

Philip A. Chou
For contributions to variational methods in information theory, signal processing, and compression.

Antonio J. Conejo
For contributions to analytical techniques for power system scheduling.

Jonothon A. Crowcroft
For contributions to network protocols.

Thomas Allen Cwik
For contributions to computational techniques in large-scale electromagnetic modeling and analysis.

Frederica Darema
For contributions to the programming of parallel and distributed computers.

Bart L.R. De Moor
For contributions to algebraic and numerical methods for systems and control.

Casimer DeCusatis
For contributions to fiber optic data communication systems.

Serge N. Demidenko
For contributions to electronic testing.

Denice Denton
For leadership in engineering education and faculty mentoring.

Frank DeWinter
For contributions to the development and application of medium voltage adjustable speed drives.

Atam P. Dhawan
For contributions to optical imaging of skin-lesions and multi-modality medical image analysis.

John M. Dobbs
For contributions to CT scanners and biomedical instrumentation.

Robert R. Doering
For leadership in the development of sub-micron CMOS and semiconductor manufacturing technology.

Edmund Durfee
For contributions to distributed artificial intelligence, multiagent systems, and real-time intelligent control.

Robert Howard Eklund
For leadership in the development and manufacturing of sub-micron CMOS technologies.

Aly Elrefaie
For contributions to optical and wireless communication systems.

Joel S. Emer
For contributions to computer architecture and quantitative analysis of processor performance.

Per Enge
For contributions to the Global Positioning System applications.

John S. Engelhardt
For leadership in the development of transmission class cable systems.

Gary Roy Engmann
For leadership in the development of analytical methods and standards for power systems.

Deborah Estrin
For innovations in scalable network protocols and sensor network research.

Tuvi Etzion
For contributions to error-correcting codes and digital sequences.

Djalma Mosqueira Falcao
For contributions to power system engineering education.

James Farmer
For technical leadership in the cable television industry.

Aly E. Fathy
For contributions to advanced antenna concepts and implementations.

Arie Feuer
For contributions to adaptive control and signal processing.

Julie Elizabeth Fouquet
For contributions to optical switch and light-emitting device technologies.

Alexander Lvovich Fradkov
For contributions to adaptive and nonlinear systems.

Li-Chen Fu
For contributions to robotic control and computer-integrated manufacturing systems.

Minyue Fu
For contributions to robust control and signal estimation.

Thomas Edward Fuja
For contributions to error control coding.

Hiromu Fujioka
For contributions to electron beam testing of semiconductor devices and circuits.

Vincent Francis Fusco
For contributions to the design of active and self-tracking antenna technology.

Vijay K. Garg
For contributions to distributed computing systems and discrete event systems.

Richard L. Garwin
For contributions to the application of engineering to national defense.

Stephen D. Gedney
For contributions to computational electromagnetics.

Ronald Barry Goldfarb
For contributions to magnetic metrology for the characterization of superconductors.

Evan Lee Goldstein
For contributions to optical communications.

Forouzan Golshani
For contributions to the field of multimedia information systems.

Turan Gonen
For contributions to electrical power distribution education.

Stephen Marshall Goodnick
For contributions to carrier transport fundamentals and semiconductor devices.

William Eric Leifur Grimson
For contributions to surface reconstruction, object-recognition, image database indexing and medical applications.

Grant Theodore Gullberg
For contributions to medical imaging technologies.

Rajesh K. Gupta
For contributions to high-level synthesis and computer-aided design of digital circuits and systems.

Robert Alexander Hanna
For contributions to the applications of medium voltage adjustable speed drives and power quality.

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For contributions to adaptive wireless communication systems.

Bin He
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For contributions to computer system architecture simulations.

John William Helton
For contributions to frequency-domain design of robust control systems.

Charles F. Henville
For contributions to power system protective relaying.

Stephen D. Hersee
For contributions to the development of quantum well lasers by metal organic chemical vapor deposition.

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For contributions to three-dimensional medical imaging and processing.

Robert T. Hill
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Ralph Leroy Hollis
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Christopher Hollot
For contributions to robust control, reset control, and Internet congestion control.

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Chaohuan Hou
For technical leadership in advancing VLSI system technology.

Jerry Hudgins
For contributions to the design, modeling, and teaching of semiconductor devices for power electronics.

Kenji Iba
For contributions to the control and planning technology of voltage/reactive power.

Nathan Ida
For contributions to electromagnetic nondestructive testing, computational electromagnetics and engineering education.

Masao Ikeda
For contributions to the theory of large scale systems and decentralized control.

Shuji Ikeda
For contributions to the development and manufacturing of static random access memory.

Adrian Ionovici
For contributions to switched-capacitor based power electronic circuits.

George W. Irwin
For contributions to the application of modern control design methods.

Masaru Ishii
For contributions to improvement of lightning performance of power lines and to the standardization of the measurement of lightning impulse voltages.

Hajime Ishikawa
For technical leadership in the development of high-performance Si and GaAs devices and circuits.

Masayuki Izutsu
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Robert W. Jackson
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Bahram Jalali
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For contributions to nonlinear control theory and automotive technology.

Augustus J.E.M. Janssen
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Ya-Qiu Jin
For contributions to an electromagnetic scattering model for remote sensing applications.

R. Wayne Johnson
For contributions to electronics that must operate in harsh environments.

Dilip Dinkar Kandlur
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Kenneth James Kerpez
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Beomsup Kim
For contributions to integrated circuits for high speed communication systems.

Harold Kirkham
For leadership in the field of optical measurements for power systems.

Daniel Koditschek
For contributions to the theory and practice of robotics and intelligent systems.

Yasuo Kuga
For contributions to back-scattering enhancement and imaging in geophysical sensing.

Sanjeev R. Kulkarni
For contributions to machine learning, pattern recognition, and data compression.

Spencer P. Kuo
For contributions to the understanding of electromagnetic wave propagation in plasmas.

Kenneth Meade Lakin
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Amos Lapidoth
For contributions to robust communications under channel uncertainty.

Richard Michael Leahy
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J. J. Lee
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Russell Jean Lefevre
For leadership and contributions to civil applications of radar technology.

Jean-Luc Bernard Leray
For contributions to the implementation of radiation hardened silicon-on-sapphire and silicon-on-insulator technologies.

Xiao-Rong Li
For contributions to the theory and practice of radar development.

Jack N. Little
For leadership in the development of engineering software for technical computing.

Yilu Liu
For contributions to modeling and diagnostic techniques for power equipment.

Jerry D. Lloyd
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Hans-Andrea Loeliger
For contributions to group codes, iterative decoding and analog implementation of decoders.

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Shoji Makino
For contributions to adaptive filtering technologies and the realization of acoustic echo cancellation.

Giuliano Manara
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Michael Jay Marcus
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Colin Craig McAndrew
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For contributions to power system security assessment.

Michael Joseph McLaughlin
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For contributions to switching technologies and systems for broadband communications networks.

Edmond Murphy
For contributions to the development and commercialization of packaging technology for components used in optical fiber communications.

Richard M. Murray
For contributions to the theory of nonlinear control and its applications to robotics, flight control, and fluid systems.

Yukihiro Nakamura
For contributions to very large scale integration synthesis methodologies.

Vishvjit Singh Nalwa
For contributions to high-resolution electronically steerable video.

Seiichi Namba
For contributions to integrated digital broadcasting systems.

Robert Mark Nelms
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Steven A. Newton
For contributions to optical reflectometry and spectrum analysis.

Jurgen Nitsch
For contributions to the analysis of complex systems for electromagnetic pulse and high-power microwave applications.

Alexander Nosich
For contributions to the applications of computational electromagnetics to antennas and open waveguides.

Hiroshi Nozawa
For contributions to non-volatile semiconductor memories.

Bruce Mitchell Nyman
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Takashi Ohira
For contributions to variable microwave signal processing circuits and antennas.

Patrick Gerard O'Shea
For contributions to charged particle accelerators and free-electron lasers.

Mikael Ostling
For contributions to semiconductor device technology and education.

Bjorn Erik Ottersten
For contributions to antenna signal processing and wireless communications.

Edward La Verne Owen
For contributions to AC adjustable-speed drives.

Bradley Paden
For contributions to nonlinear control theory and control system design for mechanical systems.

Surendra Pal
For contributions to space-borne communication systems.

Krishna Palem
For contributions to embedded computing.

Vladimir Parizhsky
For contributions to modern technology and standards development.

Yong Kwan Park
For leadership in the development of optical fiber communications technology.

Stuart Parkin
For contributions to the application of material science to devices for magnetic storage and memories.

Bradford Parkinson
For technical leadership in the development of the Global Positioning System.

Kevin Passino
For contributions to stability and control of discrete event and intelligent systems.

Raymond Paul
For contributions to metrics-guided testing and evaluation of software systems.

Sanjoy Paul
For contributions to the design and development of communication network protocols.

Ron H. Perrott
For contributions to the design and implementation of programming languages of parallel and distributed computers.

William A. Peterson
For contributions to high efficiency electronic power conversion techniques.

Friedrich Pfeiffer
For contributions to multi-body dynamics and control with application to complex mechanical systems.

Giancarlo Prati
For leadership in optical and radio communications.

Jerry L. Prince
For contributions to signal and image processing for medical imaging.

S. Ramadorai
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Robert Cornelius Rassa
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Giorgio Rizzoni
For leadership in automotive control systems.

Gordon Roberts
For contributions to the design and test of analog and mixed-signal integrated circuits, and education.

Jerzy Ruzyllo
For contributions to ultrathin oxidation in microelectronic manufacturing.

Victor Ryzhii
For contributions to the development of quantum well infrared photodetectors and quantum dot infrared photodetectors.

Nobuhiko Sawaki
For contributions to the development of group III-nitride semiconductor materials and devices.

Mohamad A.H. Sawan
For contributions to implantable medical devices.

Peter Irvin Scheuermann
For contributions to logical and physical database design.

George Thomas Schmidt
For contributions to integrated guidance and navigation systems.

Martin Schmidt
For contributions to design and fabrication of micro-electromechanical systems.

Justin Schwartz
For contributions to high temperature superconductors and magnet systems.

David Barry Scott
For contributions to CMOS and BiCMOS technology and circuits.

M. Ibrahim Sezan
For technical leadership in digital image and video processing.

Ghavam G. Shahidi
For contributions to silicon-on-insulator products technology.

Asrar Sheikh
For contributions to railroad control systems.

Yakov Shirman
For contributions to radar theory and practice.

Dariush Shirmohammadi
For leadership in restructuring of the electric power utility industry.

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For contributions to high-density packaging.

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For contributions to high performance computing.

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For contributions to intelligent control systems and applications to complex systems.

Yao Wang
For contributions to video processing and communication.

Daniel Ward
For contributions to electric power distribution systems.

Mark Wegman
For contributions to the design, implementation, and analysis of algorithms and compiler technology.

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For leadership in particle accelerator development.

Jay Martin Wiesenfeld
For contributions to semiconductor optical amplifiers for optical communications.

Thomas Turner Wilheit
For contributions to passive microwave remote sensing of geophysical parameters of Earth's surface and atmosphere.

Jay Williams
For contributions to underground transmission system design and utilization.

Alan Willner
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Moe Z. Win
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Andrew K.C. Wong
For contributions to machine intelligence, computer vision, and intelligent robotics.

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For contributions to the design and evaluation of shared-memory multiprocessors.

Dwight L. Woolard
For leadership in the discovery and development of novel sensing methodologies and advanced electronic devices at terahertz frequencies.

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For contributions to efficient signal processing algorithms for wireless communications.

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For contributions to media computing and leadership in content-based visual media analysis, retrieval and browsing.

Zhen Zhang
For contributions to source coding theory and information inequalities.

Yilin Zhao
For contributions to location and navigation technologies and systems.

Marvin Carl Ziskin
For contributions to medical applications of radiation.

Albert Y. Zomaya
For contributions to the solution of scheduling problems in parallel computing systems.

Distinguished Members and Friends,

I am delighted to have a member of the IEEE staff become the first to appear in this booklet with such luminaries and trailblazers as the individuals recognized here with IEEE Awards. The contributions IEEE staff members make in partnership with our membership worldwide cannot be understated.

The extraordinary staff member for whom the Joyce E. Farrell IEEE Staff Award was named gave 18 years of dedicated service to the IEEE before her passing in 1995. Among her colleagues, Ms. Farrell was known for her exceptional work and her principled leadership at the IEEE, even when critically ill.

The Joyce E. Farrell IEEE Staff Award celebrates individuals for their exemplary professional performance and consistent practice of the IEEE Enabling Culture Principles:

- Member No. 1 & Customer Focus
- Respect for the Employee and Volunteer
- Teamwork
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- Participatory Management
- Accountability & Our Word Is Our Bond
- Innovation & Continuous Improvement
- Open, Honest Communication & Feedback

Like the other prestigious honors in this booklet, the recipients of this award are nominated by their peers and evaluated by a peer committee. Finally, senior staff management approve the recipient and bestow the award upon him or her in a special staff ceremony.

When you read about the 2003 recipient of the Joyce E. Farrell IEEE Staff Award below, I encourage you to remember the staff members who have served you faithfully over the years.

Daniel J. Senese
IEEE Executive Director

Beverly Banks

Beverly Banks' role as IEEE Exhibits Planner involves more than just managing the exhibits portion of numerous conferences and trade shows around the world. Mrs. Banks is often the face of the IEEE at these events, addressing member concerns, recruiting new members, and providing information on the latest IEEE products and services.

Since joining the IEEE staff in 1994 as a Customer Service processing associate, Mrs. Banks has earned three promotions, the latest in 2001, when she assumed her current position. She has helped to enliven the exhibits program and continues to make it much more attractive and informative to members and prospective members.

Employees who have given five or more years of service to the organization are eligible for nomination. The Joyce E. Farrell IEEE Staff Award comprises an engraved silver bowl, certificate and honorarium.

Mrs. Banks is the eighth recipient of the award. Past recipients include:

2002 – Barbara Lange, IEEE Publications

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2000 – Abbas Ramandi, IEEE Information Technology

1999 – Judy Brady, IEEE Sales and Marketing

1998 – William F. Van Der Vort, IEEE Electron Devices Society

1997 – Jose A. Saravia, IEEE Accounting

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IEEE Dennis J. Picard Medal for Radar Technologies and Applications for outstanding accomplishments in advancing the fields of radar technologies.

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IEEE Joseph F. Keithley Award in Instrumentation and Measurement for outstanding contributions in electrical measurements.

IEEE Gustav Robert Kirchhoff Award for outstanding contributions to the fundamentals of any aspect of electronic circuits and systems that has a long-term significance or impact.

IEEE Koji Kobayashi Computers and Communications Award for outstanding contributions to the integration of computers and communications.

IEEE Daniel E. Noble Award for outstanding contributions to emerging technologies recognized within recent years.

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IEEE Photonics Award for outstanding achievement(s) in photonics.

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IEEE James L. Flanagan Speech and Audio Processing Award for an outstanding contribution to the advancement of speech and/or audio signal processing.

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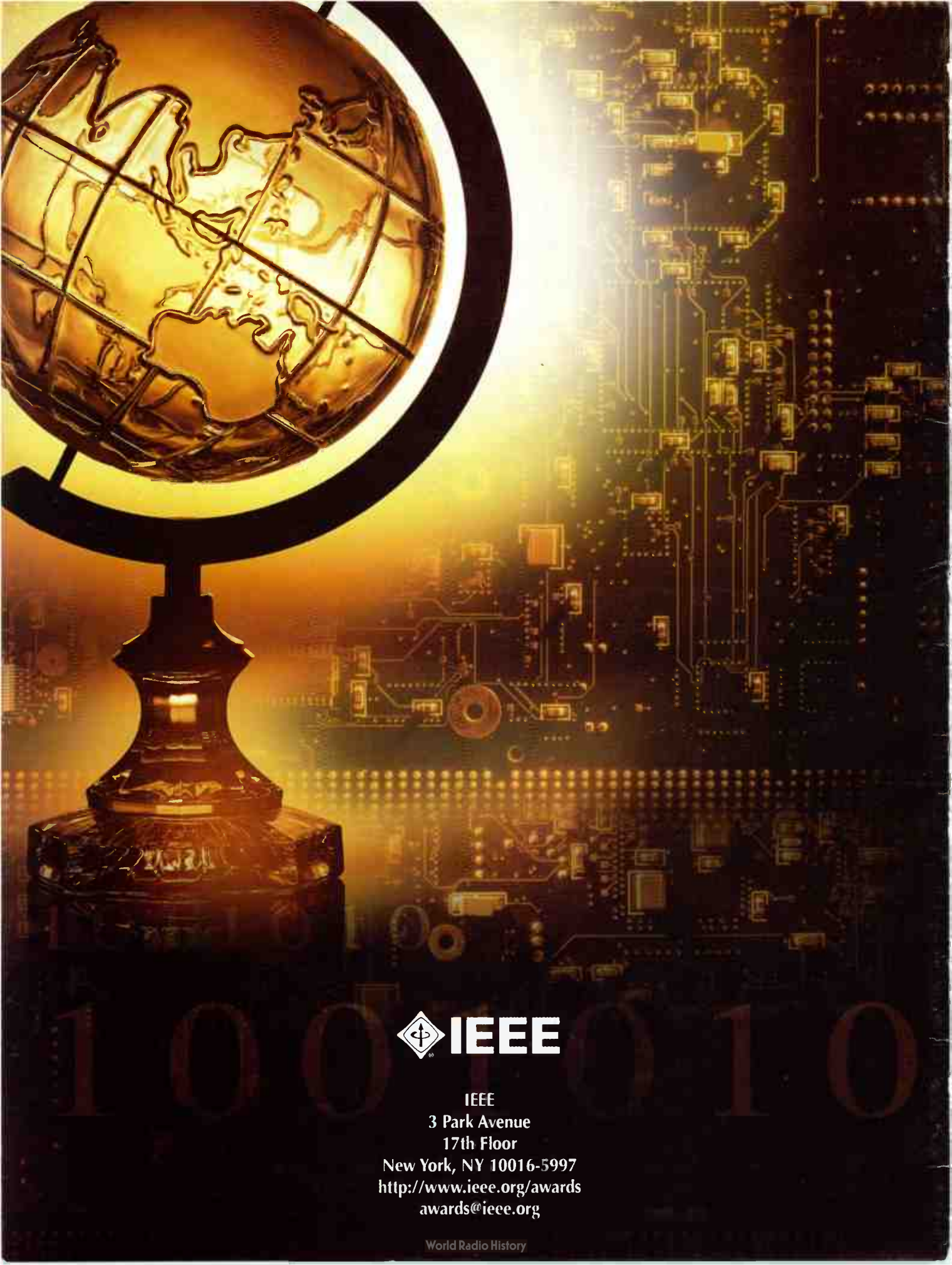

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