Authors

Palmer W. Agnew

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Mr. Agnew is a member of the Advanced Systems Department at the Endicott development laboratory. He has been with IBM since 1959, when he started as a summer student working on space guidance and self-repairing computers. He became a regular employee in 1966. Mr. Agnew has worked on system structures and design methodologies for making optimal use of LSI and VLSI for current products and for current IBM design automation systems and future products. He was one of the main architects of the IBM design automation system and the IBM 4341 microcode. Mr. Agnew is a graduate of Cornell University, where he received a B.S. in physics in 1962 and an M.S. in applied mathematics in 1966.

Max D. Brown

System Products Division, Rochester, Minnesota

Mr. Brown is a staff engineer working in low-end storage products at the Rochester development laboratory. He joined IBM in 1969 after graduating with a B.S. in electrical engineering from Michigan Technological University, Houghton. Since joining IBM, he has worked on the design of various systems, including the IBM 5100, 5110, and Series/1.

John E. Campbell

System Products Division, Kingston, New York

Mr. Campbell is an advisory engineer at the Kingston development laboratory. He joined IBM's Field Engineering Division in 1964 in Philadelphia, Pennsylvania, and received his B.S. in electrical engineering from Villanova University, Pennsylvania, in 1971. He has been involved in the development of several IBM processors. Mr. Campbell received two Division Awards for his contributions to processor design, verification, and architecture.

James W. Cooley

Research Division, Yorktown Heights, New York

Dr. Cooley joined the Research Division of IBM, where he has been a research staff member in the Department of Mathematical Sciences, in 1962. His specialties are applied mathematics, numerical analysis, and computing. He has worked on numerical solutions of differential equations, the development of numerical algorithms for Fourier analysis, and more recently, digital signal processing. He received his B.A. from Manhattan College, New York City, in 1949 and his M.A. and Ph.D. in applied mathematics from Columbia University in 1951 and 1961, respectively. Dr. Cooley was a programmer from 1953 to 1956 on the von Neumann electronic computer at the Institute for Advanced Study, Princeton, New Jersey, where he wrote programs for numerical weather prediction and spectral analysis. As a research assistant at the Computing Center of the Courant Institute at New York University, from 1956 to 1962, he worked on numerical methods for quantum mechanical calculations. He had a one-year sabbatical, in 1973–74, which he spent at the Royal Institute of Technology, Stockholm, Sweden. Dr. Cooley has served for fourteen years on the Digital Signal Processing Committee of the Society for Acoustics, Speech, and Signal Processing, has been on the Advisory Committee of that society for one term, and is now a fellow of the Institute of Electrical and Electronics Engineers.

Anthony Correale

System Products Division, Kingston, New York

Mr. Correale joined IBM's System Products Division at East Fishkill, New York, in 1974, after graduating from City College of New York with a B.S. in electrical engineering (*cum laude*). His work assignments in East Fishkill included activity in the systems integrations area and circuit design of an 8-bit custom FET microprocessor, until his transfer to the System Communications Division at Kingston in 1978. Since that time, he has been the lead engineer on a VLSI custom 16-bit FET microprocessor. He is presently an advisory engineer in the Custom Microprocessor Chip Design Department and is the lead circuit and chip design engineer of a custom state-of-the-art VLSI microprocessor. Mr. Correale has recently received a Kingston Quality Award and an IBM Outstanding Innovation Award for his circuit design work done on the custom VLSI microprocessor.

Ken Davies

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Mr. Davies is the manager of speech systems design, developing a real-time dictation system based on speech recognition. He joined IBM at Hursley, United Kingdom, in 1969. After working on PL/I at Hursley, he developed software for an international information display system at Havant, United Kingdom, from 1971 to 1973. In 1972, he joined the Thomas J. Watson Research Center, where he worked on an advanced optimizing compiler for PL/I. Since 1978, he has been concerned with signal processing architectures and software, and is currently implementing real-time speech recognition. Mr. Davies obtained a B.Sc. in mathematics from Liverpool University, United Kingdom.

Gary L. Dix

System Products Division, Rochester, Minnesota

Mr. Dix joined IBM in 1964. He received a B.S. in electrical engineering from the University of Wisconsin in 1964 and an M.S. in electrical engineering from the University of Minnesota in 1966. He has contributed to the development of a number of IBM products, including the 1800 system, the BART (Bay Area Rapid Transit) ticketing terminal, and the 3540 diskette I/O unit. His current responsibility is in the area of disk and diskette controller development.

Richard A. Forsberg

System Products Division, Kingston, New York

Mr. Forsberg is a staff engineer in Kingston. He obtained his B.S. in electrical engineering from Washington University in St. Louis, Missouri, in 1973, and is currently working towards his Master's

degree in computer science at Union College Extension, Poughkeepsie, New York. He joined IBM in 1974 at the East Fishkill, New York, facility, where he was one of the designers of the floating-point feature on an IBM processor. Since moving to Kingston in 1978, he has been a lead designer on the memory subsystem of a new minicomputer currently under development. His technical interests include computer systems architecture, design automation, and design verification. Mr. Forsberg is a member of the I.E.E.E. Computer Society.

Peter A. Franaszek

Research Division, Yorktown Heights, New York

Dr. Franaszek is a member of the Computer Sciences Department at the Thomas J. Watson Research Center. His interests include analytical problems associated with storage hierarchies, magnetic recording, and digital communications. He received the B.Sc. degree from Brown University, Providence, Rhode Island, in 1962, and the M.A. and Ph.D. degrees from Princeton University, New Jersey, in 1964 and 1965. During the academic year 1973 to 1974, he was on sabbatical leave at Stanford University, California, as a Consulting Associate Professor of Electrical Engineering and Computer Science. Prior to joining IBM in 1968, he was a member of the technical staff at Bell Telephone Laboratories. Dr. Franaszek is a member of Sigma Xi, Tau Beta Pi, and the Institute of Electrical and Electronics Engineers.

Anne S. Kellerman

System Products Division, Endicott, New York

Ms. Kellerman is a member of the Advanced Systems Department located in the Endicott development laboratory. Prior to joining IBM, she worked for the Research Foundation of the State of New York. She also taught computer science and physics at the State University of New York at Binghamton and spent a year in Costa Rica installing the first computer in that country. Since joining IBM in 1974, she has managed groups in intermediate systems and low-end systems that have been responsible for designing methodologies and system structures of current and future products. Ms. Kellerman is a graduate of Georgia Institute of Technology, where she received a B.S. in 1963 and an M.S. in 1964 in engineering physics.

Jack C. Lee

System Products Division, Kingston, New York

Mr. Lee is a staff engineer working at the Kingston development laboratory on advanced processor design. He received a B.S. in electrical engineering from the City College of New York in 1974. Since then, he has worked in an adapter group in functional products and has worked on the logic design and simulation of the processor which is currently used in an IBM system. His area of expertise is software system simulation and modeling in EDS (the Engineering Design System).

Leung Ping Lee

System Products Division, Kingston, New York

Mr. Lee, an advisory engineer, joined IBM in East Fishkill, New York, in 1973 as a circuit designer in the FET chip design area. In 1978, he was transferred to the Kingston development laboratory, where he has been working on the physical design and qualification of custom bipolar chips. After receiving a B.S. in electrical engineering from Lowell Technological Institute, Lowell, Massachusetts, in 1968, he joined Westinghouse in Pittsburgh, Pennsylvania, as a system engineer in the design of computer control of the nuclear power plant. Subsequently he worked as a research associate, designing computer hardware interfaces at the Electrical Engineering Department of the University of Rhode Island, where he received his M.S. in electrical engineering in 1973.

Keith F. Mathews

General Technology Division, East Fishkill, New York

Mr. Mathews is a senior engineer and manager of cost performance and exploratory circuits at the East Fishkill laboratory. The work described in the paper by Mathews and Lee was performed while he was manager of bipolar macro design at the Kingston, New York, laboratory. He graduated from the RCA Institute, New York, in 1958, received a B.S. in electrical engineering (*summa cum laude*) from the Polytechnic Institute of Brooklyn, New York, in 1964, and received the M.S. in electrical engineering from Syracuse University, New York, in 1970. Prior to joining IBM at Poughkeepsie, New York, in 1964, he worked for Sperry Gyroscope Company, Great Neck, New York, on the design of radar receivers. At IBM, he held a number of circuit design assignments in East Fishkill on MST, SNS, MST extensions, and the Dutchess (bipolar MSI) technology programs, before entering management in 1973. Since then he has been involved in FET logic/memory development, technology support of system design, and custom bipolar design. Mr. Mathews is a member of Eta Kappa Nu, the Institute of Electrical and Electronics Engineers, and Tau Beta Pi.

John F. McCabe

System Products Division, Kingston, New York

Mr. McCabe is a senior engineer in Kingston's bipolar VLSI group. He joined IBM in 1960 at Poughkeepsie, New York, where he worked on various assignments in the design of test equipment for IBM magnetic tape products. In 1968, he became manager of a group within the Components Division's manufacturing research organization at East Fishkill, responsible for implementation of computer process control of semiconductor hot processes. In 1972, he assumed responsibility for the introduction of new high-density LSI products into the East Fishkill manufacturing engineering organization and managed a group responsible for their test and diagnostics. Since 1978, he has worked on the development of design concepts and verification methodology for bipolar VLSI and has received an IBM Division Award for this effort. In 1958, Mr. McCabe received his B.S. in electrical engineering from Manhattan College. In 1974, he was selected by IBM to attend its full-time Master's degree program (LSI Institute) at the University of Vermont, Burlington; he received his M.S. in electrical engineering the following year.

Nicholas C. Mescia

General Technology Division, East Fishkill, New York

Mr. Mescia joined IBM in East Fishkill as a chemical/metallurgical laboratory specialist in 1967. He continued his education (A.A.A. in chemistry from New York State University A & T, Farmingdale, in 1959) and received a B.A. in chemistry from Marist College, Poughkeepsie, New York, in 1969. He is currently attending Syracuse University, New York, where he is working towards an M.S. in computer engineering. His assignments from 1967 to 1977 were in advanced electronic packaging technology, such as electrolytic and electroless plating, controlled collapse solder connections, plasma ashing/etching, evaporation, brazing, photoresist applications, and heat transfer for the LEM (liquid-encapulated module) and TCM (thermal conduction module) programs. In 1977, he transferred to East Fishkill information systems development, sensor-based systems programming, where he became the team chief for chemistry

laboratory automation projects. In 1978, Mr. Mescia became a member of the IBM Mid-Hudson Valley Engineering Education Advisory Committee for microprocessor education. Since then, he has developed and taught many microprocessor application and interfacing courses, as well as EDX programming courses on DSCs (distributed system controllers) and Series/1s. In 1979, he assumed his current position in tool automation, where his responsibilities also include integration of tools and instruments into East Fishkill's component manufacturing control system. He is currently East Fishkill's corepresentative for an internal corporate microprocessor committee. Mr. Mescia is a member of the Institute of Electrical and Electronics Engineers.

Fred Mintzer

Research Division, Yorktown Heights, New York

Dr. Mintzer joined IBM at the Thomas J. Watson Research Center in 1978, and has been engaged in research on distributed signal processing, signal processing algorithms, and data communication applications in the Computer Science Department. Dr. Mintzer received the B.S. in electrical engineering from Rutgers University in 1970 and the Ph.D. in electrical engineering and computer science from Princeton University in 1978. From 1971 until 1974, he worked as an applications engineer for the Commonwealth Telephone Company, Dallas, Pennsylvania. Dr. Mintzer is a member of Eta Kappa Nu, the Institute of Electrical and Electronics Engineers, and Tau Beta Pi.

Andrew Z. Muszynski

System Products Division, Kingston, New York

Mr. Muszynski joined IBM in 1974 at the East Fishkill, New York, development laboratory. He has worked on analog design of a high-speed transmission link, electrical package evaluation, Crosstalk (line-noise analysis) program development, and miniprocessor machine-level technology support. He is presently a manager in the VLSI development area at the Kingston laboratory. Mr. Muszynski received a B.S. from the City College of New York in 1972 and an M.S. from the Massachusetts Institute of Technology in 1974, both in electrical engineering.

Abraham Peled

Research Division, San Jose, California

Dr. Peled obtained his B.Sc. and M.Sc. degrees from the Technion-Israel Institute of Technology, and his M.A. and Ph.D. degrees from Princeton University, all in electrical engineering. He served as a project engineer at Electronics Corporation of Israel from 1970 to 1971, engaged in the design of telemetry systems. From 1971 to 1974, he was a research assistant at Princeton University, working on hardware implementation and algorithms for digital filtering. From 1974 to 1976, he was a postdoctoral fellow at the IBM Thomas J. Watson Research Center, Yorktown Heights, New York, where he worked on applications of reduced computational complexity algorithms to signal processing and designed a special-purpose processor for signal processing. From 1976 to 1978, he was a Research staff member at the IBM Israel Scientific Center, where he engaged in the design of low-cost, efficient ultrasonic image acquisition and processing for medical applications. After his return to the Thomas J. Watson Research Center as manager of signal processing applications in 1978, he investigated distributed system architectures for signal processing applications, particularly in the areas of communications, voice processing, and sonar applications. In 1980, Dr. Peled moved to the San Jose Research laboratory, where he is currently manager of the Computer Science Department. Dr. Peled is an author with B. Liu of *Digital Signal Processing—Theory, Design, and Implementation,* which has been translated into Russian and Chinese.

Frederic N. Ris

Research Division, Yorktown Heights, New York

Dr. Ris is senior manager of computation-intensive systems in the Computer Science Department at the Thomas J. Watson Research Center. Dr. Ris received a B.A. from Harvard College in chemistry and physics and a Ph.D. in mathematics from Oxford University, England. He joined the IBM Research Division in 1972 to participate in a project concerned with machine-dependent optimization for the generation of microcode from high-level languages. In 1977 he became manager of a project to develop system software tools and prototype applications for a novel digital signal processor architecture which he helped generalize and for which he was awarded an IBM Outstanding Innovation Award. He has served as technical assistant to the director of computer sciences in Research and has continued work begun at Oxford on computer arithmetic. In 1980–1981, Dr. Ris served as technical assistant to the IBM Chief Scientist and executive secretary to the IBM Science Advisory Committee at Corporate Headquarters in Armonk, New York.

Joseph Tahmoush

System Products Division, Kingston, New York

Mr. Tahmoush is an advisory engineer in the Advanced Processor Design Department. He joined IBM's System Development Division, Poughkeepsie, New York, in 1966. From 1966 to 1970, he worked on main memory designs for the IBM System/360 and System/370 series machines. Since 1970 he has contributed to various LSI and VLSI design projects in the areas of logic design, microcode, and machine organization. He obtained a B.S. in engineering from Northeastern University, Boston, Massachusetts, in 1964 and an M.S. in industrial administration from Union College, Schenectady, New York, in 1970. Mr. Tahmoush was awarded a System Products Division award in 1981 for his work in VLSI microprocessor development.

Arnold S. Tran

System Products Division, Kingston, New York

Mr. Tran is a senior associate engineer at the Kingston laboratory. He holds a B.S. in electrical engineering from the State University of New York at Buffalo and a B.A. in physics from the State University of New York College at Geneseo. Since joining IBM in 1978, he has worked on logic design and verification for the advanced processor design group.

Craig D. Woods

General Technology Division, East Fishkill, New York

Mr. Woods joined IBM at East Fishkill in 1968 after completing his B.S. in physics at Miami University, Oxford, Ohio. He received his M.S. in operations research from Union College Extension at Poughkeepsie, New York, in 1976. Initially, he worked on various tester automation projects in test equipment engineering. In 1972, he began work on the automated semiconductor fabrication line that became the Quick Turn-Around Time (QTAT) facility. In 1976, he shifted to work on the East Fishkill mini-micro strategy that evolved into the Component Manufacturing Control System-80 (CMCS-80) architecture. Mr. Woods became manager of distributed process systems development in 1979. He assumed his current position as manager of the manufacturing control systems project in 1981.