

UP from the BOTTOM

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ABSTRACT

It is now more than a half century since Richard Feynman presented his often-cited seminar bearing the provocative title, "There's plenty of room at the bottom." Feynman's observation about engineering opportunity was made several years before the invention of that great enabler, the integrated circuit, and more than a decade in advance of the first microelectromechanical systems. Both ICs and MEMS proved that indeed there is valuable room at the bottom, room for engineering systems that have provided legs for the profound upheaval of society itself through the internet, wireless communications, and related ground-breaking cousins. Today the design frontier is described in nano-scale units-- giving rise to application horizons that are expanding at ever-increasing rates. A major challenge for engineers today is to bring 'up from the bottom' the newly developed capabilities and to apply them in the solution of human-scale problems.

Richard S. Muller, biographical notes

Richard S. Muller spent his boyhood just across the Hudson River from New York City in Union City, NJ and from there commuted to adjacent Hoboken to earn the degree of Mechanical Engineer at Stevens Institute of Technology in 1955 (with highest honor). Armed with employment and a fellowship from Hughes Aircraft Co., he moved to California and entered the California Institute of Technology as an MS candidate in EE. Inspired at Caltech by Prof. R.D. Middelbrook in the then new EE discipline of solid-state electronics, he moonlighted from his job as a circuit designer at Hughes to teach a graduate course on transistors in the evening program at USC. In 1962, Dr. Muller joined the Electrical Engineering Dept at UC Berkeley to become part of its nascent IC teaching and research efforts. He concentrated his research and teaching on the physics of IC devices and collaborated with HP researcher Ted Kamins (Muller's first doctoral student) to produce "Device Electronics for Integrated Circuits" published first in 1977. Still being sold (in its 3rd edition revised with Dr. Mansun Chan), the book has topped 60,000 copies in sales of the English edition and it also is in print in both old and new Chinese, as well as in Spanish, Italian, and Russian. In the late 1970s, Muller began research in the area now known as MEMS and, together with Professor R.M. White he founded the Berkeley Sensor & Actuator Center in 1986. In the early 1990s, he wrote the proposal to establish the IEEE/ASME Journal of Microelectromechanical Systems (JMEMS), and has served as its Editor-in-Chief since 1998. Elected a member of the US National Academy of Engineering and an IEEE Life Fellow, Muller was awarded the IEEE Brunetti Award (1998 with R.T. Howe) for the first demonstration of polycrystalline silicon micromachining. He also received a career MEMS Award at Transducers '97, a Fulbright Professorship at TU Munich (1982-3), and a von Humboldt Research Professorship at TU Berlin (1994-5). Other Awards include the Berkeley Citation, the IEEE Millennium Medal, the IEEE Electron Devices Society Distinguished Service Award (2007), and the Renaissance Award from Stevens Institute of Technology. He has been a member of the National Materials Advisory Board and served on several National Research Council study panels as well as chairing a 1997 panel for which he acted as editor of a widely distributed report on the promises and challenges of MEMS. Professor Muller serves as a liaison officer between the NAE and NRC and has been Chair of an advisory panel for the Helmholtz Foundation. He is secretary on the governing board for the Transducer Research Foundation, and served on the Board of Trustees of Stevens Institute of Technology from 1995 to 2005.