Digital Integrated Circuit Testing for Art Historians and Test Experts

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This talk is my attempt to identify the basic concerns in digital IC production testing. The details, too often, crowd in and prevent us from understanding why we are having difficulties: why testing is too costly or why too many bad chips escape (pass) the test despite our best efforts. Then I want to explore some of the myths representing the common wisdom about testing. My opinions will be supported by the results of experiments - not simulations, but real-world tests - carried out on actual chips from various technologies.

Biography

Professor McCluskey worked on electronic switching systems at the Bell Telephone Laboratories from 1955 to 1959. In 1959, he moved to Princeton University, where he was Professor of Electrical Engineering and Director of the University Computer Center. In 1966, he joined Stanford University, where he is Professor of Electrical Engineering and Computer Science, as well as Director of the Center for Reliable Computing. He founded the Stanford Digital Systems Laboratory (now the Computer Systems Laboratory) in 1969 and the Stanford Computer Engineering Program (now the Computer Science MS Degree Program) in 1970. The Stanford Computer Forum (an Industrial Affiliates Program) was started by Dr. McCluskey and two colleagues in 1970 and he was its Director until 1978.

Professor McCluskey developed the first algorithm for designing combinational circuits - the Quine-McCluskey logic minimization procedure as a doctoral student at MIT. At Bell Labs and Princeton, he developed the modern theory of transients (hazards) in logic networks and formulated the concept of operating modes of sequential circuits. His Stanford research focuses on logic testing, synthesis, design for testability, and fault-tolerant computing. Prof. McCluskey and his students at the Center for Reliable Computing worked out many key ideas for fault equivalence, probabilistic modeling of logic networks, pseudo-exhaustive testing, and watchdog processors. He collaborated with Signetics researchers in developing one of the first practical multi-valued logic implementations and then worked out a design technique for such circuitry.
Dr. McCluskey served as the first President of the IEEE Computer Society. He is the recipient of the 1996 IEEE Emanuel R. Piore Award. He is a Fellow of the IEEE, AAAS, and ACM; and a member of the NAE. He has honorary doctorates from the University of Grenoble and Bowdoin College. He has published several books including two widely used texts.