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Proceedings of Second Caltech Conference on

VERY LARGE SCALE INTEGRATION

PROCEEDINGS

of the Second Caltech Conference on

VERY LARGE SCALE INTEGRATION

held at the

California Institute of Technology

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Organized by the Caltech Computer Science Department

and the Caltech Industrial Associates Office

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Editor: Charles L. Seitz

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FOREWORD

As Lynn Conway pointed out in her invited talk (page 5), the two-year period between that first VLSI conference held at Caltech in January 1979 and this Second Caltech Conference on VLSI "...has been one of tremendous activity in VLSI, a time of real discovery and rapid progress."

Let me mention two of the important milestones reached in this period. Regular and reliable channels for those of us in universities to fabricate our designs were established, and several existing and new companies are organizing to provide such services commercially. The building of clean interfaces between design and fabrication, and the possible restructuring and broadening the design base of the microcircuit industry along this pattern, is the theme of the invited speakers session that opened the conference.

Introduction to VLSI Systems by Carver Mead and Lynn Conway was published in the Fall of 1980, and, with some stimulus also in the form of "teacher's courses," the VLSI design courses and project laboratories pioneered in a few universities and innovative companies seem since to be spreading exponentially.

That Lynn Conway and Carver Mead were the central figures in both of these accomplishments, and that their energies have been directed at these two projects that have made the VLSI research community more cohesive and cooperative, is surely a testimony to their insight and character.

The technical sessions were organized to provide a broad view -- including fabrication, innovative designs, design tools, design disciplines, and architecture -- of research efforts underway in industry, government, and universities.

The 28 papers presented were selected by the organizing committee from nearly five times as many submitted. We received many more excellent papers than we could accept for presentation and publication.

We at Caltech are very pleased with the alternation established with the MIT Conference on Advanced Research in Integrated Circuits in January 1980, and January 1982, and recommend to the interested reader the proceedings of the January 1982 conference and of other conferences held at the University of Edinburgh (August 1981) and Carnegie-Mellon University (October 1981). Proceedings from these conferences were published by Academic Press (VLSI81), Edinburgh), by Computer Science Press (VLSI Systems and Computations, Carnegie-Mellon), and Artech House, Dedham, MA (Proceedings, Conference on Advanced Research in VLSI, MIT January 1982). Proceedings of the Caltech conferences, January 1979 and January 1981, will continue to be available through the Computer Science Librarian, Caltech 256-80, Pasadena, CA 91125.

Alas, the commercial publishers we approached in the fall of 1980, prior to the publication of the Mead & Conway text, were not yet ready to publish VLSI Proceedings, and we had to undertake this job internally. Your editor greatly regrets and apologizes to the authors and to those who had to wait for their orders to be filled for the extraordinary delays we have experienced in preparing this 600-page document. Very special thanks go to my secretary, Vivian Davies, for her care and persistence in assembling the document, making arrangements with printers, and sorting out the orders, after a turnover in our staff, as well as reminding the editor frequently of his duties.

This conference was organized jointly by the Caltech Computer Science Department and the Caltech Industrial Associates Office, and was sponsored by the Industrial Associates and by the National Science Foundation. My thanks to Bernie Chern of NSF for his support and assistance in expanding the representation at the conference to many more universities.

Finally, let me express my thanks and appreciation to the technical program committee, consisting of Forest Baskett, Xerox PARC and Stanford University; Alan L. Davis, University of Utah; Lee Hollaar, University of Utah; Paul Hudak, University of Utah; Lennart Johnsson, Caltech; Thomas F. Knight, Jr., Massachusetts Institute of Technology; James D. Meindl, Stanford University; Glenn Miranker, IBM Corporation; Martin Newell, Xerox

PARC; Martin Rem, Technical University, Eindhoven, and Caltech; James A. Rowson, Caltech; Dick Sites, Digital Equipment Corporation; Harold Stone, University of Massachusetts; and Gerald J. Sussman, Massachusetts Institute of Technology, for classifying and refereeing the very large number of papers over a brief period before Christmas.

Charles L Seitz
Conference Chairperson and Proceedings Editor