ASSOCIATION FOR COMPUTING MACHINERY · FOUNDED 1947 · ACM

SIGDA NEWSLETTER

SPECIAL INTEREST GROUP ON DESIGN AUTOMATION

Vol. 1 No. 2 May 1971

Table of Contents

Present SIGDA Organization

Executive Committee:

Charles E. Radke - IBM, Poughkeepsie, New York - Chairman

Lawrence Margol - Microdesign, Anaheim, California - Vice Chairman

John Hanne - Texas Instruments, Dallas, Texas - Secretary/Treasurer

Editorial Board

Walter Samek - Combustion Engineering, Windsor, Connecticut - Editor

Gerhard Paskusz - University of Houston, Houston, Texas - Associate Editor

Lawrence Margol - Executive Committee Representative

Official Representative of SIGDA on 1971 Design Automation Workshop Committee - C. E. Radke

Technical papers appearing in this issue are unrefereed working papers.

Message from Chuck Radke , Chairman of SIGDA

In the January 1971 SIGDA Newsletter, I discussed how SIGDA was re-establishing itself as an active professional organization.

We published a January 1971 issue of the SIGDA Newsletter .... and now a May 1971 issue. We are planning an informal SIGDA meeting at the 1971 SJCC, a SIGDA meeting at the 8th Annual DA Workshop, as well as the annual SIGDA meeting at the 1971 ACM Conference. Two SIGDA sessions are being organized at the 1971 ACM Conference in Chicago (August 3,4,5). I am organizing a session of four papers covering problems in mechanical and electronic DA. Whereas Steve Krosner of IBM Kingston is organizing a session covering computer-aided design in building architecture and construction planning, Walt Samek, of Combustion Engineering has proposed and is assisting in organizing a panel session on Computer-Aided Design and Manufacturing at the Jerusulem Conference on Information Technology, which will be held in August 1971.

That is the present .....now what about the future?

A survey form was enclosed with the last SIGDA Newsletter. How many have filled out the form and returned it to Professor Jerry Paskusz at the University of Houston? The future depends upon you, the SIGDA members and future members! What we need is an organization fed by active participants toward objectives of sponsoring conferences, workshops, technical paper session, tutorial sessions, publishing newsletters, etc. I as chairman will strive for such an active organization.

But now we must start questioning what SIGDA should be to the membership. Design Automation as an interdisciplinary field and as a user of various computer-related tools is relatively new, is rapidly growing, is spreading to new disciplines, is gaining recognition as being important in hardware, software, and system design, and definitely is not restricted to computer design. How do we make a diverse membership with diverse interests meaningful to one another?

It is seen that all design data handling problems are similar, whether the data is on automobile design or computer design. The space assignment problem in building layout has a similarity with electronic packaging layout. The need for a user-designer language exists for computer designers and mechanism designers as well as architects. The need for testing sequences, test data, testing language is invariant.

The challenge I see is not to create a hodgepodge of DA approaches to different disciplines, but instead to attempt to relate an approach in a given discipline to a general DA type problem. More emphasis should be given to defining problems in more general terms, in stating classes of constraints to the solutions, and to more general problem solving. But the big question is "how?".

I feel that SIGDA can become interdisciplinary and be relevant to all its members. I can only assume that you must also feel that way.

As a start, I challenge each of you to ponder these questions as you listen to conference papers during the next several months, as you read DA articles in the professional journals, and as you carry out your function in the rapidly growing area of Design Automation. I will do so, and would appreciate hearing about the thoughts which you have. The Newsletter as well as the approaching SIGDA meetings would be the perfect medium to bring out your ideas and thoughts.

Charles E. Radke
SIGDA Chairman

Forthcoming SIGDA Activity and Meetings

1. SJCC - An informal SIGDA meeting will be held at the 1971 Spring Joint Computer Conference (May 18, 19, 20) in Atlantic City, New Jersey, on Wednesday May 19. The meeting is scheduled for 6:30 P.M. in the Pine Room at the Traymore Hotel.

   This will be the first meeting of the "New" SIGDA. All interested parties are invited to meet the Executive Board and Newsletter Staff, plus discuss the "New" SIGDA.

2. 1971 DA Workshop - A formal SIGDA meeting will be held at the 8th Annual Design Automation Workshop (June 28, 29, 30) in Atlantic City, New Jersey. A meeting room has been requested for Monday evening (June 28th) and a room has been assured. However, depending upon the final Workshop committee's plan, the meeting may have to be held on Tuesday evening instead. The day, time, and place will be announced at the Workshop.

   All SIGDA members are encouraged to attend not only the Workshop but also the SIGDA meeting. Although the plans are not final for that meeting, we plan to have a brief business meeting (less than 10 minutes) and a panel discussion.

3. 1971 National ACM Conference - At that conference in Chicago on August 3, 4, 5, SIGDA plans to:

   a. Sponsor a session of four papers in the general area of Design Automation.

   b. Sponsor a session of 3 to 4 papers in the area of building design and architectural design automation.

   c. Hold our annual SIGDA meeting on August 3rd or 4th (refer to conference program for exact date and time).

The SIGDA Profile

Forty-five more or less completed forms of the "Survey of SIGDA Members" have been returned by now and I expect only a few more to arrive.

Analysis of the survey has been made a little tricky by the ambiguity we unwittingly built into it. Some of us considered the suggested 1 to 7 scale as an absolute rating scale, where the same score (e.g. 4) can be assigned to several items. That wouldn't be so bad, if it were possible to tell whether 1 or 7 is the high score. FORTRAN was never like this!

At any rate, some preliminary results are already evident. For example, we obviously consider the primary functions of the newsletter to be, in that order, Dissemination of Technical Information, SIGDA activity announcing, and Opinion Forum. Executive Committee Announcements don't seem to raise much interest (as voting didn't) and some respondents seriously question whether unification is a good idea, or that the newsletter ought to serve as a unifying influence.

A more detailed report of the survey results will appear in the next issue of the newsletter.

Gerhard Paskusz

How to Become A Member of SIGDA

Persons interested in joining SIGDA (whether or not they are ACM members) are invited to write to:

Association for Computing Machinery
1133 Avenue of the Americas
New York, N. Y. 10036

The membership fee of $3 for ACM members, or $5 for non-members, should accompany their letter. This will cover one year of membership and will put them on the mailing list for the SIGDA Newsletter.

Call for Abstracts

Attention Authors of DA Related Material

Authors are invited to submit 100 - 200 word abstracts of their books or papers to the editor of the SIGDA Newsletter, whose address they will find elsewhere in the present publication.

A Message from the DA Workshop Chairman

As most of you know, the Eighth Annual Design Automation Workshop will be held June 28-30 at the Shelburne Hotel in Atlantic City. Since SIGDA is one of the co-sponsors of this event, all members should consider attending and should take an active role in promoting the attendance of others. In particular, we should try to stimulate the interest of people who are not likely to be on the Workshop mailing list, but who may nevertheless profit from exposure to the material.

This year, in response to criticism received last year, we have planned the Workshop to be a little different. For one thing, there will be two tutorial sessions: one by Maurice Hanan of IBM/Yorktown Heights on "The Placement Problem," the other by John Hanne of Texas Instruments on "The Management of Design Automation." Thus, whether you are a novice or an expert, a manager or a worker, there should be something here of educational value for you.

In addition, we recruited Bill Miller of Albert C. Martin and Associates, who presented a well-received paper at last year's Workshop, to organize some sessions in the relatively new area of architectural design automation. How well he has succeeded can be judged from the fact that when the time came to select papers on the basis of merit, we ended up with 40% in the architectural field! We believe you will be pleasantly surprised at the quality of work being done by these people, and at the commonality of their problems with those encountered in electronic design.

We have also tried to facilitate communication between members of the audience and the authors: there will be an opportunity to chat with authors immediately following each technical session. There will also be the usual "Birds of a Feather" sessions in the evening where you can exchange information informally and perhaps find a way to solve that intractable problem you are currently working on.

In short, we believe this Workshop will prove beneficial to all who attend. Despite the shortage of travel funds this year, we urge you to join us in Atlantic City.

Alan H. Halpin, Chairman
8th Annual Design
Automation Workshop

P.S.-- The Shelburne offers very attractive rates to attendees. Why not plan to bring the family and stay over the Fourth of July weekend? It's worth considering!

DA Workshop Preliminary Program

In the following we list the preliminary program of the
8th Annual Design Automation Workshop
which will take place at
The Shelburne Hotel, Atlantic City, N. J.
on June 28, 29 and 30, 1971.

The definitive program and registration information will be mailed to members of the sponsoring societies (ACM, IEEE, SHARE), as soon as it is finalized.

In addition to the sessions listed below, there will be the traditional Birds of a Feather meetings, during which people with common interests have been known to let their hair down, talk turkey, and tell it like it is.

Also there will be an official SIGDA meeting, during which the newly installed slate of officers will introduce themselves to the membership, and will answer questions to the best of their ability. Further information will be found elsewhere in this newsletter.

Monday, June 28, 1971

Opening Session

9:00 AM Introduction by Workshop Chairman, Alan H. Halpin

9:15 AM Keynote Address by Charles A. Fowler, Raytheon

10:30 AM "The Placement Problem - A Tutorial", by Maurice Hanan, IBM Research, Yorktown Heights

Session 1A: A Digital Design Language

Chairman: Pat O. Pistilli, Bell Telephone Laboratories, Denver, Colorado

2:15 PM "A Digital System Modeling and Design Language" Mehmet B. Baray, Stephen Y. H. Su, University of California, Berkeley

2:45 PM "The Structure and Operation of a System Modeling Language Compatible Simulator", Mehmet B. Baray, Stephen Y. H. Su, Robert L. Carberry, University of California, Berkeley

3:15 PM "System Modeling Language Translator", Mehmet B. Baray, Stephen Y. H. Su, University of California, Berkeley

Session 1B: Introduction to Architectural Design Automation

Chairman: William R. Miller
Albert C. Martin and Associates, Los Angeles

2:15 PM "A Summary of Architectural Involvement with Computers" C. Jones Olsten, California State Polytechnic College, San Luis Obispo

2:45 PM "The Future of Computer Applications in the Architectural Profession", Gifford H. Albright, The Pennsylvania State University

3:15 PM "A Systems Approach to Housing", Anthony J. Schnarsky, University of Wisconsin, Milwaukee, Wisconsin

Session 2A: Simulation

Chairman: Soon Oh Hong, RCA, Marlboro, Mass.

4:00 PM "A Microprogram Simulator", Steve Young, RCA, Marlboro, Mass.

4:30 PM "Race Analysis of Digital Systems Without Logic Simulation" R. A. Harrison, D. J. Olsen, Delco Electronics, Milwaukee, Wis.

Session 2B: Interactive Design Systems

Chairman: Alyce Branum, Information Displays, Inc., Encino, Calif.

4:00 PM "Architectural Interactive Design System (AIDS)", Eric Teicholz, Design Systems, Inc., Boston, Massachusetts

4:30 PM "IMAGE: An Interactive Graphics-Based Computer System for Multi-Constrained Spatial Synthesis", Guy Weinzapfel, Massachusetts Institute of Technology

TUESDAY, JUNE 29, 1971

Session 3A: Packaging

Chairman: Ben Britt, IBM, San Jose, California

9:00 AM "Revisiting an Operational Graphic Design System", Steven P. Krosner, William H. Sass, IBM, Kingston, New York

9:30 AM "ALMS: Automated Logic Mapping System", Roy L. Russo, Peter K. Wolff, Sr., IBM Research, Yorktown Heights, New York

10:00 AM "Partitioning and Ordering of Logic Equations for Optimum MOS LSI Device Layout", L. Margol, Microelectronics Company, Anaheim, California

10:45 "A Computer Algorithm for Placing Electronic Components with the Objective of Minimizing Total Interconnecting Wire Length" F. Taylor Scanlon, Honeywell Information Systems, Phoenix, Arizona

11:15 AM "Wiring Routing by Optimizing Channel Assignment Within Large Apertures", Akihiro Hashimoto, James Stevens, University of Illinois, Urbana, Illinois

Session 3B: Computer-Aided Space Planning

Chairman: Vahe Khachooni
Daniel, Mann, Johnson, and Mendenhall, Los Angeles

9:00 AM "An Approach to Computerized Space Planning Using Graph Theory", John Grason, Carnegie-Mellon University

9:30 AM "ACD: Computer Aided Design", Franz S. Veit, Architect, Grand Island, New York

10:00 AM "The Automated Generation of Architectural Form", William Mitchell, University of California, Los Angeles

10:45 AM "Heuristic Algorithms for Automated Space Planning" Charles M. Eastman, Carnegie-Mellon University

11:15 AM "RELATE: Relationship Layout Technique", Richard N. White, Lester Gorsline and Associates, Tiburon, California

12:00 Noon Conference Luncheon
Speaker to be announced

2:15 PM Joint Session

"The Management of Design Automation -- A Tutorial"
John R. Hanne, Texas Instruments

4:00 PM Common Interest Group Meetings

WEDNESDAY, JUNE 30, 1971

Session 4A: Testing and Test Generation - I

Chairman: J. Paul Roth, IBM Research, Yorktown Heights, N. Y.

9:00 AM "A Path Analysis Approach to the Diagnosis of Combinational Circuits", Sarma R. Vishnubhotila, Ying H. Chuang, Washington University, St. Louis, Mo.

9:30 AM "Application of a Logic Fault Analyzer to the Manufacture and Maintenance of the Control Data 7600 Computer", Lionel C. Bening, Jr., CDC, Saint Paul, Minnesota

10:00 AM "An Automated Method for Designing Logic Circuit Diagnostic Programs", Masaaki Nagamine, Fujitsu Limited, Kawosaki, Japan

Session 5A: Testing and Test Generation - II

Chairman: J. Paul Roth, IBM Research, Yorktown Heights, N. Y.

10:45 AM "The Detection and Diagnosis of Memory System Faults", Alan R. Klayton, Lehigh University, Bethlehem, Penn.

11:15 AM "Minimum Test Patterns for Residue Networks", Douglas C. Bossen, Daniel L. Ostapko, Arvind M. Patel, Martin S. Schmookler, IBM-SDD, Poughkeepsie, New York

Session 4B: Design Models

Chairman: Anthony J. Schnarsky, University of Wisconsin

9:00 AM "CLUSTER: A Program for Structuring Design Problems", Murry Milne, University of California, Los Angeles

9:30 AM "The Three Dimensions of Architectural Design Automation", Harvey N. Lerman, Martin Marietta Corporation, Orlando, Florida

10:00 AM "Computer Simulation of Elevator Systems", Alton J. Peng, Carnegie Mellon University

Session 5B: Architectural Management Systems

Chairman: Ted Harsham, Hertza & Knowles, San Francisco

10:45 AM "An Information System in Architectural Practice", C. David Sides, Jr., Skidmore, Owens and Merrill, Architects, San Francisco, California

11:15 AM "Project Management Systems for Architecture", James F. Weaver, Louis C. Kingscott and Associates, Inc., Kalamazoo, Michigan

Session 6A: Design Automation Systems

Chairman: Harry M. Taxin, Hughes Aircraft, Culver City, California

2:15 PM "RAINBOW: An Integrated CAD System", Heinz U. Lemke, C. J. Cheney, M. Etherton, N. E. Wiseman, University of Cambridge, Cambridge, England

2:45 PM "An Interactive Graphical Logic Design Simulation System", W. B. Barker, Harvard University, Cambridge, Massachusetts

3:15 PM "CIBOL - An Interactive Graphics Program Used in the Design of Printed Wiring Boards and Generation of Associated Art Masters", T. J. Kriewall, N. R. Miller, Bell Telephone Laboratories, Whippany, N. J.

4:00 PM "The On-Line Logical Simulation (OLLS) System", Richard M. Tavan, H. Robert Howie, Cambridge, Massachusetts

4:30 PM "Logic Design System, A Problem Oriented Language to Program Automated Digital Design", Carl E. Minich, Frederick G. Linnemann, Sanders Associates, Inc., Nashua, New Hampshire

Session 6B: General Topics in Design Automation

Chairman: Harlow Freitag, IBM Research, Yorktown Heights, N. Y.

2:15 PM "NONLISA: Nonlinear Network Simulation and Analysis Program" Toru Tsuda, Takuhito Kojima, Shinji Goto, Toshihiko Naramura, Fujitsu Limited, Kawasaki, Japan

2:45 PM "Multiply Indexed Data Management", Thomas Beretvas, IBM-SDD, Poughkeepsie, New York

3:15 PM "Computer Controlled Hardware Testing", Jean Sherman, IBM-SDD, San Jose, California

4:00 PM "Mask Shop Information System", J. G. Brinsfield, Bell Telephone Laboratories, Whippany, N. J.

4:30 PM "Computer Expansion of Boolean Expressions", Ying H. Chuang, Washington University, St. Louis, Mo.

The following item was contributed by Larry Margol, Associate Editor, SIGDA Newsletter.

The following is an abstract of the article "Computer-Aided Preliminary Layout of Customized MOS Arrays" by R. P. Larsen appearing in the May issue of the IEEE Transactions on Computers.

ABSTRACT - One of the most perplexing problems confronting device designers utilizing MOS technology is the development of an effective layout design methodology. This paper describes a versatile layout design scheme for customized digital-type MOS arrays utilizing four-phase clocking schemes (ratioless logic). The analytical characterization of this layout design scheme is defined through the introduction of p-order and m-order indices. The p-order indices are assigned to members of the Boolean equation set that define the relative placement of their mechanization areas (p-diffusion structures) on the MOS array. The m-order indices are assigned to members of the term set that define their relative placements within parallel metalization channels on the MOS array. The underlying variables influencing the algorithmic derivation of quasi-optimal p-order and m-order assignments are also discussed.

This preliminary layout design methodology is then related to the computer-aided design environment. Two computer programs, named P-ORDER and M-ORDER, that comprise the computer-aided design environment are briefly described. A simple example is also presented to illustrate the complementary relationships that exist between the device designer and computer within the computer-aided design environment. Computer inputs and outputs for this simple problem are presented to stress the minimal input requirements and the pictorial characterizations of computer-synthesized solutions, which are essential ingredients to cost effective computer-aided design applications.

INDEX TERMS - Computer-aided design, LSI, layout design algorithms, MOS arrays, preliminary layout.

Professor Jack Sklansky reports that the University of California at Irvine is actively engaged in research on automatic recognition of features in pictures by computer analysis and modeling of the human picture recognition process. UCI has had support from the Air Force Office of Scientific Research and National Science Foundation for research into automatic recognition machines. A grant is also expected from the National Institute of Health for a combined Engineering School and Medical School effort in x-ray picture analysis. The research program also has potential application in fault analysis of LSI and MSI devices.

Attention all Readers active in Circuit Board Layout.

Dr. C. L. Strodtman of Lear Siegler in Grand Rapids, Mich., is interested in hearing from all users of the following programs:

PUZZLE by Ron Zane and Deanna Harrell of Lawrence Radiation Lab.

UCARDS by J. F. Jamison of Union Carbide.

Anybody using, or otherwise connected with, these programs is invited to contact

Dr. C. L. Strodtman
Lear Siegler, Inc.
Instrument Division
4141 Eastern Ave., S.E.
Grand Rapids, Mich. 49508
Phone No. 616-241-7000

The formation of users' groups for these programs and of a subgroup of SIGDA dealing with computerized circuit board layout has been suggested. So how about it, all you circuit board designers out there?

Editor's Note

Your editor recently had the very pleasant experience of receiving the SIGDA membership list from ACM Headquarters. This list contains 217 names of people engaged or interested in DA, including 32 names from 13 foreign countries. The wide geographical spread of the members' addresses is clear proof of the widespread interest in DA. This in turn imposes an extra burden upon your newsletter, which must provide something of value to every member.

Now we are always anxious to maintain contact with all our members. This is easy for those of you living in the U.S. or in Canada. All they have to do is pick up the phone and let me have their complaints (as some have already done). Feedback from other countries, on the other hand is not so easy to come by. SIGDA will never know whether it is providing the information its foreign members want to receive, unless, of course, these members take appropriate action to let us know.

I am therefore directing an urgent appeal to all foreign members to tell us what they are doing in DA, and what they expect to get from the newsletter. Those of you not sufficiently fluid in English, feel free to use your native tongue, and don't worry, we'll translate it. Address your communication to me and I will try to fulfill your wishes as far as possible.

For your information, I am giving you below the names of the foreign countries in which SIGDA is represented. The list is in alphabetic order of the English names of the countries.

Australia
Belgium
Canada
Czechoslovakia
France
Great Britain
Italy
Japan
Netherlands
Norway
Sweden
Switzerland
West Germany

Walter J. Samek
Combustion Engineering, Inc.
Dept. 617-C
Windsor, Conn. 06095
U.S.A.

Book Review

H. Y. Chang, E. Manning, G. Metze
Fault Diagnosis of Digital Systems
Wiley-Interscience 1970, 150 pp., $9.50

Beginning with some basic definitions and progressing through the idea of gedanken experiments toward generating tests for sequential logic--the authors lead you on a clearly defined path.

The first sections of the book describe the history of test generation and attempt to provide some reasons for considering this problem worthy of solution. From this basic groundwork they then introduce techniques for generating tests. First for combinatorial circuits and then for sequential ones. They also discuss minimization of test patterns and fault simulation. All these topics are presented clearly and with many examples that enable the reader to weigh the relative merits of each algorithm or heuristic.

The latter sections of the book discuss the work on the Sequential Analyzer done by Sundrun Seshu. This technique is described in some detail. The book then wraps up with a discussion of fault dictionaries and some speculation as to the future trends of test generation.

In general I found this book well written and a welcome addition to my library. It is valuable both to the novice and the experienced student of test generation who might not be able to understand the original works. It is the aim of the authors not to treat each technique completely but rather to stimulate the reader so that he will delve into the works in their original form.

Steve Krosner
IBM
Yorktown Heights, N.Y.

ACM Charter Flight to Ljubljana

To service members and their families ACM has arranged for a charter flight to the 5th International Congress of IFIPS, to be held August 23-28, 1971, in Ljubljana, Yugoslavia.

The ACM charter flight will depart for Zagreb, Yugoslavia, from Washington, D.C., and/or New York City on August 15, 1971. Zagreb will be the starting point for two different group tours, or for independent travel.

Following the congress the ACM charter group will be returned to Zagreb and will depart on August 29, 1971, for home.

The round trip fare per person will not exceed $245. Specific information about this charter flight should be requested from:

Miss Elaine M. Kokiko
Moshman Associates, Inc.
6400 Goldsboro Rd.
Washington, D.C. 20034
Phone (301) 229-3000