Resume

Ellis Horowitz

TOPICS AHEAD

Short Biography

Dr. Ellis Horowitz received his B.S. degree from Brooklyn College and his Ph.D. in computer science from the University of Wisconsin. He was on the faculty there and at Cornell University before assuming his present post as Professor of Computer Science and Electrical Engineering at the University of Southern California. He has also been a visiting Professor at M.I.T. and the Israel Institute of Technology (Technion).

Dr. Horowitz has held numerous academic administrative jobs including Associate Chairman of Computer Science at the University of Wisconsin. At U.S.C. he was chairman of the Computer Science Department from 1990 to 1999.

Dr. Horowitz is the author of ten books and over eighty journal articles and refereed conference proceedings on computer science subjects ranging from data structures, algorithms, and software design to computer science education. He has been a principal investigator on research contracts from NSF, AFOSR, ONR, and DARPA. He is a past associate editor for the journals *Communications of the ACM* and *Transactions on Mathematical Software*. He was an IBM Scholar from 1989-1993.

After completing his term as Computer Science department chairman, Dr. Horowitz was appointed Director of Information Technology and Distance Education in USC's Viterbi School of Engineering. Part of his responsibilities included the Distance Education Network (DEN). As Director he oversaw an operation that offers more than 200 graduate engineering courses per year to more than 1,000 students. Courses are delivered across the United States by satellite broadcast and Internet webcast.

Dr. Horowitz is an active consultant to the legal community, specializing in intellectual property issues. He was the founder and CEO of Quality Software Products, a California Corporation, from 1983 - 1993. The company designed and developed UNIX application software.

Personal Data

Married, 3 children, U.S. Citizen

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Home page: http://www.ellishorowitz.com/

Education:

Univ. of Wisconsin, Madison	Ph.D. Computer Science
Univ. of Wisconsin, Madison	M.S. - Computer Science
Brooklyn College	B.S. - Mathematics

Employment History

- Professor, Computer Science and Electrical Engineering, University of Southern California, 09/1983 - Present

Other Academic Positions Held Simultaneously

- Director, Distance Education and Information Technology, 09/1999 – 07/2001

- Acting Chairman, Computer Science Dept. USC, 07/2008 – 06/2009

- Chairman, Computer Science Dept. USC, 06/1991 – 09/1999

- Visiting Associate Professor, Department of Electrical Engineering and Computer Science, *M.I.T.*, 09/1979 – 01/1980

Ph.D. Thesis: Advisor: George E. Collins

''Algorithms for Symbolic Integration of Rational Functions,''

Current Research Interests

• Software Engineering, methods for improving programming and programmer productivity.

• Software development across the Internet/World Wide Web; peer-to-peer computing.

• Search engine design and development accessing the so-called "Invisible Web"

Past Professional Activities

1. ACM *National* Lecturer, Lecturing on recent advances in arithmetic and algebraic algorithms.

2. SIGSAM: Vice-Chairman, Assistant Editor of SIGSAM Bulletin; Participant in SIGSAM Lectureship Program, Special Interest Group on Symbolic and Algebraic Manipulation

3. SIGCAS: Chairman, Special Interest Group on Computers and Society

4. Referee and reviewer for *J. ACM, C. ACM, SIAM J. Comp.*, N.S.F. Office of Computer Activities, *J. Theoretical Comp. Sci., IEEE Trans. on Computers*, *IEEE*

Trans. on Software Eng., IEEE Computer.

5. Reviewer for Addison Wesley, Harper & Row, and McGraw-Hill books on Computer and Information Science.
6. Editor, *Transactions on Mathematical Software*.
7. Editor, *Communications of the ACM*.

Courses introduced at USC

Search Engines: (CS572) This course provides a complete treatment of web search engines. Major topics of investigation include: crawlers, ranking, and content analysis.The class is centered around reading seminal papers and includes presentations by student members. A class project will require the student to leverage the search engine techniques learned during the course , coupled with programming/implementation that may involve such software systems as Lucene and Nutch.

Programming the World Wide Web: (CS351/CS571) This course focuses on the phenomenon known as the World Wide Web (WWW or Web). Its main objective is to present many of the technologies that the Web is based upon, including: HyperText MarkUp Language (HTML), HyperText Transfer Protocol (HTTP), programming languages for client-side applications, namely JavaScript and VBScript, and programming languages for server-side applications, namely Perl, Active Server Pages and Java Servlets.

Analysis of Algorithms: (CS 570 and CS 303) A one semester course presenting mostly recent results on the complexity of arithmetic and algebraic algorithms.

Computerized Society: (CS 140) An interdisciplinary course designed to study the political, economic, social and cultural impact of computers on society.

Modern Techniques for the Design of Reliable Software: A short course designed for industrial programmers and systems analysts. Topics include techniques for the design, coding, testing, and managing of software systems.

Programming Languages: (CS571 and CS 420) A comparative study of programming languages, emphasizing the evolution of imperative languages from FORTRAN to ALGOL60, PASCAL, SIMULA, EUCLID, CLU and ADA. More recent languages include PROLOG, ML, and various dialects of LISP.

Management of Computing Program: Joint between the School of Business, Annenberg School of Communications and the Computer Science Department, its emphasis is to offer graduate level courses on the management of computer technology. Introduced two new courses: The Computer Software Products Industry and Managing a Computing Center.

Data Structures: (CS 202 and CS 455a) A basic undergraduate-graduate course consisting of ways to structure data for processing by computer including topics such as trees, binary trees, list processing, searching and sorting techniques.

PUBLICATIONS:

Journals:

1.　''Fads Pass but Paradigms Remain,'' Short Note, *C.ACM*, vol. 14, no. 3, March 1971, p. 197. Reprinted in *C.ACM*, vol. 26, no. 1, Jan. 1983, pp. 106.

2.　''Computers and Society: A Proposed Course for Computer Scientists,'' *C.ACM*, vol. 15, no. 4, April 1972, pp. 256-26l (with H. Morgan and A. Shaw).

3.　''A fast Method for Interpolation Using Preconditioning,'' *Information Processing Letters*, vol. 1, no. 4, June 1972, pp. 157-163.

4.　''The Efficient Calculation of Powers of Polynomials,'' *J. Computer and Systems Science*, vol. 7, no. 6, October 1973, pp. 469-481.

5.　''Computers, Society and the Law,'' *C.ACM*, vol. 17, no. 11, November 1973, p. 715, also in *Jurimetrics Journal*, vol. 14, no. 3, Spring 1974, pp. 138-140.

6.　''Computing Partitions with Applications to the Knapsack Problem'' *J. ACM*, vol. 2l, no. 2, April 1974, pp 277-292 (with S. Sahni).

7.　''A Unified View of the Complexity of Evaluation and Interpolation,'' *Acta Informatica*, vol. 3, no. 2, 1974, pp. 123-133.

8.　''The Minimum Root Separation of a Polynomial,'' *Math. Comp.*, vol. 28, no. 126, April 1974, pp. 589-597 (with G. Collins).

9.　''On Computing the Determinant of Matrices with Polynomial Entries,'' *J. ACM*, vol. 22, no. 2, January 1975, pp. 38-50, (with S. Sahni).

10.　''The Computation of Powers of Symbolic Polynomials,'' *SIAM J. Computing*, vol. 4, no. 2, June 1975, pp. 201-208 (with S. Sahni).

11.　''A Sorting Algorithm for Polynomial Multiplication,'' *J.ACM*, vol 22, no. 4, October 1975 (also in *Proc. Math. Software II*, Purdue, May 1974), pp. 450-462.

12.　''FORTRAN - Can it be Structured and Should it Be?'' *Computer*, IEEE Computer Society, vol. 8, no. 6, June 1975, pp. 30-37.

13.　''Exact and Approximate Algorithms for Scheduling Uniform Processors,'' *J.ACM*, vol. 23, no. 2, April 1976, pp. 317-327.

14.　''The Training of Computer Scientists for Developing Nations,'' *C.ACM*, vol. 20, no. 12, December 1977, pp. 968-971.

15.　''Abstract Data Types and Software Validation,'' *C.ACM*, vol. 21, no. 12, December 1978, pp. 1048-1063. (with J. Guttag, D. Musser)

16.　''Combinatorial Problems: Reducibility and Approximation,'' *J. Ops. Res.*, vol, 26, no., 5, September 1978, pp. 718-759. (with S. Sahni).

17.　''A Linear Time Approximation Algorithm for Multiprocessor Scheduling,'' *BIT*, vol. 19, no. 3, 1979, pp. 312-320 (with G. Finn).

18.　''The Binary Tree as an Interconnection Network: Applications to Multiprocessor Systems and VLSI'' *IEEE Trans. on Computers*, vol. C-30, no. 4, April, 1981

19.　''Divide-and-Conquer for Parallel Processing'', *IEEE Trans. on Computers*, vol. C-32, number 6, June 1983, (with A. Zorat).

20.　''Concurrent Communication and Synchronization Mechanisms'', *J. Software - Practice and Experience*, vol. 14 no.2, pp. 135-151, Feb. 1984. (with R. Williamson)

21. ''Algorithms for Trie Compaction'' *ACM Trans. on Data Bases*, vol.9, no. 2 June, 1984, 243-263. (with M. Al-Suwaiyel)

22. ''An Expansive View of Reusable Software'', *IEEE Trans. on Soft. Eng.* Vol. SE-10, No. 5, Sept. 1984, 477-487. reprinted in *Tutorial: Software Reusability*, edited by Peter Freeman, IEEE Computer Society Press, pp 39-49.

23. ''A Survey of Application Generators'', *IEEE Software*, vol. 2 No. 1, Jan. 1985, 40-54 (with Kemper and Narasimhan), reprinted in *Selected Reprints in Software*, edited by M. Zelkowitz, IEEE Computer Society Press, Third Edition, 1987, 192-206.

24. ''SODOS: A Software Documentation Support Environment - Its Definition'' *IEEE Trans. on Software Engineering*, vol.SE-12, no.8, Aug. 1986, (with R. Williamson)

25. ''SODOS: A Software Documentation Support Environment - Its Use'' *IEEE Trans. on Software Engineering*, vol. SE-12, no. 11 Nov. 1986, (with R. Williamson) Reprinted in ''Computer-Aided Software Engineering (CASE),'' Edited by Elliot Chikofsky, *IEEE Computer Society*, Long Beach, Ca. 1988.

26. ''An Integrated System for the Creation of Educational Software'', *Perspectives on Computing*, vol.8, no.1, Spring 1988, pp. 35-42.

27. ''A Formal Model for Software Project Management'', *IEEE Trans. on Software Engineering*, vol. SE- no. 10, October 1989 pp. (with L. Liu)

28. ''A Guide to the Object-Oriented Database Landscape'' *Object Oriented Databases and Applications to CASE, Networks, and VLSI CAD*, Prentice-Hall, Englewood Cliffs, New Jersey, 1990, with R. Gupta, pp. 1-12

29. ''An Overview of Existing Object-Oriented Database Systems'' *Object Oriented Databases and Applications to CASE, Networks, and VLSI CAD*, Prentice-Hall, Englewood Cliffs, New Jersey, 1990, with R. Gupta, pp. 101-116.

30. ''The Development of a Framework for VLSI CAD'' *Object Oriented Databases and Applications to CASE, Networks, and VLSI CAD*, Prentice-Hall, Englewood Cliffs, New Jersey, 1990, with R. Gupta, pp. 237-260.

31. ''Object Database Support for CASE'' *Object Oriented Databases and Applications to CASE, Networks, and VLSI CAD*, Prentice-Hall, Englewood Cliffs, New Jersey, 1990, with Lung-Chun Liu, pp. 261-282.

32. "Building your own software development environment", *Software Engineering Journal,* vol. 6, Number 5, September 1991, pp. 317-331 (with Y. Sugiyama)

33. "Experimental results from a prototype next generation process support system", Review Technology, vol. 2, number 1, Summer 1994 (with Boehm, Bose and Lee)

34. "Cost Models for future life cycle processes: COCOMO2.0", Annals of Software Engineering, vol2, 1995 (with Boehm, Clark, Westland, Madachy and Selby)

35. "WinWin: A system for Negotiating Requirements", DACS Software Tech News, vol. 3, number 1, 1999 (with Joo Lee and June Lee)

36. "Indexing the invisible web: a survey", *Online Information Review*, Vol. 29, No. 3, 2005, pp. 249-264

Books

1. *Practical Strategies for Developing Large Software Systems,* edited collection, Addison-Wesley Publishing Co., March 1975.

2.   Fundamentals of Data Structures, Computer Science Press, division of W.H. Freeman, New York, August 1976 (with S. Sahni). Over 100,000 copies sold worldwide. Translated into Portuguese, Chinese.

3.   Fundamentals of Computer Algorithms, Computer Science Press, division of W.H. Freeman, New York, September 1978 (with S. Sahni). Translated into German.

4.   Programming Languages: A Grand Tour, edited collection, Computer Science Press, division of W.H. Freeman, New York, First Edition 1983, Second Edition 1986.

5.   Fundamental Concepts of Programming Languages, Computer Science Press, division of W.H. Freeman, New York, 1983.

6.   Fundamentals of Data Structures in Pascal, Computer Science Press, division of W.H. Freeman, New York, 1983.

7.   Fundamentals of Data Structures in Turbo Pascal, Computer Science Press, division of W.H. Freeman, New York, 1988.

8.   Object Oriented Databases and Applications to CASE, Networks, and VLSI CAD, Prentice-Hall, Englewood Cliffs, New Jersey, 1990, with R. Gupta.

9.   Fundamentals of Data Structures in C, Computer Science Press, division of W.H. Freeman, New York, 1992.*

10.   Fundamentals of Data Structures in C++, Computer Science Press, division of W.H. Freeman, New York, 1995. (with S. Sahni)

11.   Computer Algorithms in C++, Computer Science Press, division of W.H. Freeman, New York, September 1996 (with S. Sahni and Sanguthevar Rajasekaran)

12.   Software Cost Estimation with COCOMOII, Prentice Hall, New Jersey, 2000 (with Boehm, Abts, Brown, Chulani, Clark, Madachy, Reifer and Steece)

13.   Fundamentals of Data Structures in C++, Second Edition, Silicon Press, Summit, New Jersey, 2007. (with S. Sahni)

Proceedings of Refereed Conferences

1.   ''Algorithms for Partial Fraction Decomposition and Rational Function Integration,'' *Proc. 2nd Symposium on Symbolic and Algebraic Manipulation*, Los Angeles, March 1971, pp. 441-457.

2.   ''Modular Arithmetic and Finite Field Theory: A Tutorial,'' *Proc. 2nd Symposium on Symbolic and Algebraic Manipulation*, Los Angeles, March 1971, pp. 188-194.

3.   ''Research Problems in Symbolic Mathematics,'' *SIGSAM Bulletin*, no. 18, April 1971, pp. 7-9.

4.   ''On Decreasing the Computing Time for Modular Arithmetic,'' *Proc. 12th Annual Symposium on Switching and Automata Theory*, IEEE, East Lansing, Michigan, October 1971, pp. 126-128 (with L. Heindel).

5.   ''Algorithms for Rational Function Arithmetic Operations,'' *Proc. 4th Annual ACM Symposium on the Theory of Computing*, Denver, Colorado, May 1972, pp. 108-119.

6.   ''The Application of Symbolic Mathematics to a Singular Perturbation Problem,'' *Proc. 25th Annual ACM Conference*, Boston, August 1972, pp. 8l6-825.

7.   ''Symbolic Solution of the Y@-(2n) Problem,'' *SIGSAM Bulletin*, no. 24, ACM,

October 1972, pp. 22-24.

8. ''On the Substitution of Polynomial Forms,'' *Proc. 26th Annual National ACM Conference*, Atlanta, August 25, 1972, 153-158.

9. ''Computers and Society: An Interdisciplinary Approach,'' *Proc. 3rd Symposium on Computer Science Education*, vol. 5, no. 1, February 1973, pp. 134-137 (with M. Horowitz).

10. ''The Design of Data Type Specifications,) *Proc. of the 2nd IEEE Symposium on Software Engineering*, San Francisco, October 1976, (with J. Guttag and D. Musser), pp. 414-420.

11. ''The Art of the Algorithmist,'' *Proc. 29th Annual National ACM Conference*, Houston, October 1976, pp. 442-444.

12. ''Some Extensions to Algebraic Specifications,'' *Proc. ACM Conference on Language Design for Reliable Software*, March 1977, (with J. Guttag and D. Musser).

13. ''VLSI Architectures for Matrix Computations,'' *Proc. 1979 International Conference on Parallel Processing*, IEEE, Bellaire, Michigan, August 1979.

14. ''The Binary Tree as an Interconnection Network'', *Proc. 1980 Conference on networks*, IEEE, Purdue, April, 1980.

15. ''The Computer Software Products Industry in the '80s'', *Proc. National ACM Conference*, ACM, Los Angeles, November, 1981.

16. ''The Computer Software Products Industry in Transition'', *Proc. 1981 Conf. on Information Systems*, Boston, Dec. 1981.

17. ''The Office Workstation of the '80s'', *Proc. Office Automation Conference*, AFIPS Press, San Francisco, April 5-7, 1982, 637-638.

18. ''An Expansive View of Reusable Software'', *Proc. Workshop on Reusability in Programming*, September 7-9, 1983, Newport R.I., 250-262.

19. ''Application Generators: Ideas for Programming Language Extensions'', *Proc. ACM Annual Conf.*, San Francisco, Oct. 8-10, 1984, 94 - 101. (with A. Kemper and B. Narasimhan).

20. ''High-Level Input/Output Facilities in a Database Programming Language'', *Proc. International Conf. on System Sciences*, Jan. 1985, 67-80. (with A. Kemper)

21. ''SCriptWriter: An Environment for Creating Multi-Media Productions'', *Proc. IBM Academic Information Systems University AEP Conf.*, Washington, D.C. June 1985, 79 - 82.

22. ''SCriptWriter- Integrated Software Development Environment for CAI'', *IBM Academic Information Systems University AEP Conference Agenda*, San Diego, Ca., April 1986, 90.

23. ''SCriptWriter II: From Vaporware to Freeware'', *Proc. IBM Academic Information Systems University AEP Conf.*, San Diego, Ca. April 1986.

24. ''SCriptWriter: A Multi-Media System for Creating Educational Software'', *Proc. Nat'l Educational Computing Conf.*, San Diego, Ca. June 1986, 36.

25. ''Using the Player Metaphor to Create Educational Software'', *Proc. IBM AEP Conf.*, Boston, June, 1987.

26. ''The Development of Perspective in Renaissance Art'', *Proc. IBM ACIS Univ. Conf.*, Boston, June, 1987, 48-54.

27. ''Cbase1.0: a CAD Database for VLSI Circuits Using Object Oriented Technology'', *Proc. of the IC-CAD Conference*, (with M.A. Breuer, W. Cheng, R. Gupta, I. Hardonag, and S.Y. Lin) 1988.

28. ''Database Support for Software Project Management'', *Proc. ACM Conf. on Practical Software Development Environments*, Boston, Ma., November, 1988, pp. (with L. Liu)

29. ''A framework for specification and design of software for advanced sensor systems,'' *Proc. 10th Real-time Systems Symposium*, Santa Monica, Ca. December 1989 (with Alice Muntz)

30. "OPM: Object Process Modeling Environment", *5th International Software Process Workshop, 1990,* with Y. Sugiyama

31. "Software Requirements as Negotiated Win Conditions" Proc. Internatnational Conference on Requirements Engineering, IEEE, April 1994, (with Boehm, Bose, Lee)

32. "Experimental results with a prototype next generation process support system" *SIG Technology Review Journal,* 1994, (with Boehm, Bose, Lee)

33. "A Collaborative Spiral Software Process Model Based upon Theory W", *3rd International Process Conf.* 1994 (with Boehm, Bose)

34. "Software Requirements Negotiation and Renegotiation Aids: A Theory-W Based Spiral Approach", *IEEE Proc. of the 17th ICSE Conf.* Seattle, 1995 (with Boehm, Bose, and Lee)

35. "Modelling Graphical User Interfaces", *Tenth International Conf. on Mathematical and Computer Modelling and Scientific Computing*, Boston, July 1995 (with Singhera)

36. A New Approach to Software Tool Interoperability, in proceeding of ACM 11th Annual Symposium on Applied Computing, Philadelphia, Pennsylvania, February, 1996. (with Y. Bao)

37. A Flexible Integration Framework for Software Interoperability, in proceeding of 11th International Conference on Computers and Their Applications, San Francisco, March 1996.(with Y. Bao)

38. An Alternative Strategy for COTS and Third-Party Tool Integration Based on User Interface, *Proceeding of California Software Symposium*, Los Angeles, April, 1996.(with Y. Bao)

39. ''UNIX Offers Power for Multiple-Project Management'', Government Computer News, January 16, 1987, pp.70.

40. ''SCriptWriter: A System for Building Educational Software'', *USC Engineer*, vol. 37, no. 1, Spring, 1987, 13-16

41. "RPP: A System for Prototyping User Interfaces, *Proc. SIGCHI*, New Orleans, 1991.(with J.H. Chien, S.T. Fu, and C. Rouff)

42. "A System for Specifying and Rapidly Prototyping User Interfaces", *Taking Software Design Seriously"*, ed. John Karat, Academic Press, 1991, pp. 257-272.

43. "A new approach to software tool interoperability," *Proc. ACM 11th Annual Symposium on Applied Computing*, Philadelphia, Pa. February, 1996, (with Yimin Bao)

44. "A flexible integration framework for sofwarte interoperability," *Proc. 11th International Conference on Computers and their applications*, San Francisco, March 1996 (with Yimin Bao)

45. "Interoperating through user interface: an alternative way for COTS integration," *Proc. of California Software Symposium,* April 1996 (with Yimin Bao).

46 "Charting the Future of Distance Education at USC", Faculty Forum, vol. 2, no. 3/4, 2000-2001, pp. 4-5

47. "Design and Classification of Algorithms", *Encyclopedia of Computer Science*, 1st, 2nd, 3rd and 4th Editions, Eds. A. Ralston, E. Reilly, D. Hemmendinger, Nature Publishing Group, 2000, pp. 45-51.

48. "Computer Science", in Dictionary of the History of Ideas, vol. 2, pp. 429 – 433, Editor, M. Horowitz, Scribners, 2004

49. "Algorithms for Real-Time Gathering and Analysis of Continuous-Flow Traffic Data," *Proc. IEEE Intelligent Transportation Systems Conference*, Toronto, Sept., 2006, pp 1454-1459.

50. "Extracting Problem Solved Concepts from Patent Documents", Proceedings of the 2nd International Conference on Patent Information Retrieval, Hong Kong, Nov. 6, 2009 (with S. Tiwana)

51. "FindCite – Automatically Finding Prior Art Patents", Proceedings of the 2nd International Conference on Patent Information Retrieval, Hong Kong, Nov. 6, 2009 (with S. Tiwana)

Research Grants

1. NSF, 2 years, 9/71-9/73, $77,500 ''A study of algorithms for symbolic mathematical computation.''

2. NSF, 18 months, 6/74-1/76, $30,000 ''Investigation of some arithmetic and algebraic algorithms.''

3. JSEP (Joint Services Electronics Program), 15 months, 6/75-9/76, $20,000 ''Tools for structured program development.''

4. NSF, 2 years, 6/76-6/78, $72,700 ''Improved software reliability via axiomatic specification of data structures'' (with John Guttag).

5. NSF, 3 years, 7/78-12/81, $189,000 ''Improved software reliability via axiomatic specification of data structures - II'' (with John Guttag).

6. AFOSR, 3 years, 6/82-8/85, $210,000, ''Improving software productivity by the use of application generators''.

7. DARPA, 3 years, 5/86 - 9/89, $858,000, ''Designing Circuits for Testability'', (with M. Breuer and A. Parker)

8. Hughes Aircraft Company, Support Systems Division, $66,980, ''Implementing a CALS database Using Object oriented technology'', 1/88-12/88.

9. Hughes Aircraft Company, EDSG Division, $15,000, ''Studies in Object Oriented Databases'', 6/88-12/88.

10. AT&T, 2 years, 9/88-8/90, $636,000, ''Object Technology for Software Configuration Management'', (with S. Ginsburg, R. Hull, D. Jacobs)

11. NSF, 3 years, 7/89-6/92, $1,500,000, ''VISCOM: A multiprocessor system for image/vision processing and neural network computing'', (with K. Hwang, B. Sheu, and R. Chellappa)

12. NSF, 5 years, 1/93-12/97, $1,200,000 "Infrastructure Grant for InterNetworking",

(with D. Estrin).

13.   Microsoft, 1 year, 2002, $50,000 Integration of .NET Technologies with Computer Science Courses

14.   Microsoft, 1 year, 2002, $40,000, Investigating Wireless Technology with .NET

15.   Google, 1 year, $10,000, AJAX Programming and Web Services, 2004

Doctoral Students

1.   Sartaj Sahni, 1973, ''Exact and approximate solutions to the knapsack problem'', presently professor of computer science at the University of Florida, Gainesville.

2.   Alessandro Zorat, 1979, ''A divide-and-conquer machine'', presently Professor at the Istituto Per La Ricerca Scientifica e Tecnologica, 38050 povo, Trento Italy

3.   M. al-Suwaiyel, 1979, ''An investigation of the trie data structure'', presently President, King Abdulaziz City for Science and Technology, Saudi Arabia.

4.   Thomas Mowbray, 1983, ''Language Features for a Static Data Flow Environment''. Working in Industry.

5.   Ron Williamson, 1984, ''SODOS: A Software Documentation Support Environment'' presently working for Hughes Aircraft Corp.

6.   Alfons Kemper, 1984, ''Programming Language Constructs for Data Intensive Application Development'' presently a professor at University of Karlsruhe, West Germany.

7.   Marco Papa, 1988, ''Bit Blitting and Polygon Clipping: Analysis and Experiences'' presently working at Los Angeles Superior Court.

8.   Lung-Chun Liu, 1988 ''Software Project Management'', currently Senior Director, Verplex Systems, Inc. in Milpitas, CA.

9.   Yasuhiro Sugiyama, 1990, ''Object Process Modeling'', June 1990, presently working as a Professor at Nihon University

10.   Alice Muntz, 1990, "The Design of Real-time Software", June 1990, presently working in industry at GlobeTel Communications

11.   Christopher Rouff, 1991, "Specification and Rapid Prototyping of User Interfaces", June 1991, Currently working at SAIC.

12.   Zafar Singhera, 1994, "Modeling Graphical User Interfaces", Currently working at Oracle in the Bay Area

13.   June Sup Lee, 1997, "The design of middleware", currently working in Korea

14.   Allen Nikora, May, 1998, Software system defect prediction from development process and product characteristics", currently working for Jet Propulsion Systems, JPL, Pasadena, CA

15.   Yanbo Ru, "Automatic Generation of the Logical Structure of Web Pages", Dec. 2006, Currently working in industry in Los Angeles

16.   Jeffrey Miller, 2007, "RealTime Processing of Traffic Data", May, 2007, currently an Assistant Professor at the University of Alaska, Anchorage

17.   Shahzad Tiwana, 2009, "The Ranking and Clustering of Patent Documents", Fall, 2009, Assistant Professor, National University of Science and Technology, Islamabad, Pakistan

Professional Society Memberships

1. Assoc. of Computing Machinery 1965 - Present
2. Institute for Electronic and Electrical Engineers 1970 - Present
3. American Association for the Advance of Science
4. SIGMA XI
5. Forensic Expert Witness Association

Experience Related to Legal Matters

My primary field of specialization is computer software. I have wide ranging experience with many programming languages and with software systems created from these languages. My specific area of research is software engineering, which has to do with the design and development of large-scale software systems. Recently I have been involved in the Internet/World Wide Web, developing software systems that use the Internet to deliver its results.

In addition to my experience as a professor, technical manager, implementer and entrepreneur, I have handled a number of technical legal matters over the past few years. My experience has generally fallen in two major areas:

Patents: I have dealt with several cases where the issue was whether an infringement of a patent had occurred. In these cases I made a close examination of the patent claims and then investigated the subject software to determine whether any claims were infringed. I have also done invalidity searches.

Copyrights: Cases here involved a determination of whether one set of code was derivative from another. I have examined software source code directly, and I have used special tools to analyze software programs.

Illegal File Sharing: I have been involved in numerous cases involving peer-to-peer software systems used to facilitate the downloading of copyrighted content. The cases include: Grokster, LimeWire, and various BitTorrent systems.

Litigation support: In all of my cases I have directly supported the attorneys by advising about technical matters. I have prepared expert reports and declarations, reviewed material prepared by the attorneys, participated in depositions, and testified at trial. I always attempt to reduce complicated concepts to their simplest form, and rely upon analogies where appropriate.

Experience with Distance Education

From 1999 - July 2001 I was the Director of the Distance Education Network (DEN) within USC's School of Engineering. DEN delivers graduate engineering courses to more than 1,000 students each year. More than 150 graduate engineering courses are delivered to more than 1,000 students affiliated with our corporate sponsors.

As Director I managed a staff of twenty-seven and a budget of $3 million per year. Among my chief responsibilities were:

- the introduction of webcasting as a delivery mechanism. DEN now webcasts all

of its 150 courses each year

- profit and loss responsibility. DEN is a profitable unit of the School of Engineering

- developed internal computer systems including a student database for recordkeeping

- developed an extensive web site to aid in communication with our distance students. All student activities including advisement, enrollment, homework and exams are administered via the website, den.usc.edu

- initiated a non-credit effort, where short courses are produced and distributed both via CD-ROM and over our broadcast network

Other Professional Activities

1. **IBM Consulting Scholar**

For six years I was working with IBM's ACIS division developing applications and interest in their line of UNIX workstations, the Risc System 6000.

Experience in Private Industry

I am a co-founder (with Lawrence Flon) of Quality Software Products Company, a California corporation that specialized in the development of UNIX application software. Starting in 1983 we developed and sold several software products including: Q-calc a multi-user spreadsheet program, MasterPlan, a project management system that does Gantt and PERT charting and eXclaim!, an X-based spreadsheet program. For several years I shared CEO responsibilities with Dr. Flon. Therefore, I had experience managing an organization of more than 20 people with gross sales exceeding $1 million per year. I had responsibility for sales, marketing, distribution, hiring and firing of personnel. I managed several software development projects, supervising requirements development, design, coding and testing. In 1993 the product line of the company was sold to Island Graphics.

Experience in Academic Administration

When I assumed the chairmanship of Computer Science at USC in 1990 there were 19 tenure track faculty. The department was processing approximately $3 million per year in research. The department was ranked somewhere between 20th and 25th in comparison with other computer science departments.

When I stepped down as chairman of the department, there were more than 50 faculty, (24 tenure track and 32 research faculty). The department was processing approximately

$15 million per year in research. The department was ranked somewhere between 12th and 15th in comparison with other computer science departments.

Curriculum

I managed four degree programs: a B.S. degree in Computer Science administered through the College of Letters, Arts, and Sciences, a BS in CECS (Computer Engineering/Computer Science) administered through the School of Engineering, a M.S. and Ph.D. degrees administered through the Graduate School.

Faculty Appointments/Promotions

Over my term as chairman I hired three senior level professors and twelve assistant professors. I oversaw the promotion of six assistant professors to associate with tenure and the subsequent promotion of four associate professors to full professor.

Department Research Grants

As chairman, I lead a group of faculty in developing a research proposal to NSF for a CISE grant. We won the competition in 1992 and received a $5 million grant over 3 years. We used the funds to build up the networking research infrastructure within the department.

In 1995 I participated with other faculty in responding to a Request for Proposals from Intel Corp. As a result we received more than $1 million in computer hardware and software

In 1997 I arranged for a $2.5 million grant to the department from the Microsoft Corporation. The grant was for hardware, software, and some personnel support.

Department Industrial Affiliate Board

I created a department Industrial Affiliate Board. Members included Beckman Scientific, Candle Corp., Hewlett-Packard, IBM, Intel, Lucent, Microsoft, Sun Microsystems, and TRW, and others. Companies were invited to the department's two day Research Overview in the early Fall. In addition, we assisted in their recruiting efforts on campus.

Other Academic Activities

- Established the department's first web site.

- Enrollments in all four degree programs increased substantially.

- Established a Distinguished Lecture Series

- Joined the Computing Research Association

Experience in Editing and Publishing

Editor for Computer Science Press, Computer Software Engineering Series
- Wayne Amsbury *Structured BASIC and Beyond*
- Jean-Loup Baer *Computer Architecture*

- Bateman and Pitts *COBOL Programming*
- Peter Calingaert *Assemblers, Compilers and Program Translation*
- M.S. Carberry, H.M. Khalil, J.F. Leathrum, J.S. Levy *Foundations of Computer Science*
- Shimon Even *Graph Algorithms*
- W. Findlay and D.A. Watt *Pascal: An Introduction to Methodical Programming*
- Ellis Horowitz and Sartaj Sahni *Fundamentals of Computer Algorithms*
- Ellis Horowitz and Sartaj Sahni *Fundamentals of Data Structures*
- Ellis Horowitz *Fundamentals of Programming Languages*
- Ellis Horowitz *Programming Languages: A Grand Tour*
- Tom Logsdon *Computers and Social Controversy*
- Ira Pohl and Alan Shaw *The Nature of Computation*
- Salomma *Jewels of Automata Theory*
- Spencer *Computers in Number Theory*
- Jeffrey D. Ullman Principles of Database Systems