



Stephen V. Rice, Ph.D.

Computer Scientist
Software Engineer

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Summary of Qualifications

- Ph.D. computer scientist, with more than 30 years of experience in the computer field
- Expertise in algorithms, computer audio, computer simulation, database systems, pattern recognition, programming languages, and related areas
- Experienced software developer using C, C++, Java, on Windows, Unix, Android platforms
- Founded [Comparisons Corp.](#), an audio software company, and created the *FindSounds* Web search engine
- Designed two commercial object-oriented programming languages for computer simulation: Simscript III and Modsim
- Research on optical character recognition (OCR) systems
- Taught computer science to college students in disadvantaged parts of the country — New Mexico in the 1980s, and recently, Mississippi

Experience

- Computer Consultant, since 1994
- Chief Technology Officer, [Comparisons Corp.](#), since 1997
- Computer Science Professor, University of Mississippi, 2003-2010
- Chief Software Engineer, UNLV Information Science Research Institute, 1991-1996
- Early years, 1978-1991
 - Senior Computer Scientist, SAIC, 1990-1991
 - Software Product Technical Manager, CACI Products Co., 1986-1989
 - Computer Science Instructor, San Juan College, 1984-1986
 - Senior Technical Staff, Synapse Computer Corp., 1983-1984
 - Senior Technical Staff, Oracle Corp., 1982-1983
 - Associate Programmer, IBM Santa Teresa Laboratory, 1981-1982
 - Graduate Research Assistant, University of Illinois, 1979-1981 (half time)
 - Assistant Systems Programmer, Burroughs Corp., 1978-1979 (summers)

Education

- Ph.D. in Computer Science, University of Nevada, Las Vegas (UNLV), 1996
 - Doctoral Dissertation, *Measuring the Accuracy of Page-Reading Systems* ([pdf](#)), awarded Best Dissertation by the UNLV College of Engineering
 - First Ph.D. in Computer Science earned in the state of Nevada
 - GPA 4.0 on a 4-point scale
- M.S. in Computer Science, University of Illinois at Urbana-Champaign, 1981
 - Master's Thesis, *The Null Value in Relational Databases*
 - GPA 5.0 on a 5-point scale
- B.S. in Mathematics, Western Michigan University, 1979
 - Honors in Mathematics, Senior Award in Statistics, Minor in Computer Science
 - GPA 4.0 on a 4-point scale; graduated summa cum laude at age 19

Research & Development in Computer Audio (since 1997)

- Developed a unique “sound-matching” algorithm for measuring the similarity of sounds; it emulates the human perception of sound similarity and has many applications
- Created a content-based audio retrieval technology that searches audio data for sounds that are similar to an example sound (also known as a “sounds-like search”)
- Invented and patented the technique of coloring the audio waveform display to convey the frequency content of an audio signal



- Led the development of [FindSounds.com](#), the first Web search engine for sound effects
 - “Hits” are represented by colored waveform displays
 - First Web search engine with content-based audio retrieval
 - Currently processes each month more than 2 million sound searches for more than 300,000 users; more than 150 million sound searches have been processed since its launch in 2000
 - Profiled on television and radio, and in magazines and newspapers; selected by *PC World* magazine as one of 50 Web sites in its 2002 Best of the Web review
- Led the development of the [FindSounds Palette](#) audio retrieval system
 - Integrates searching of local and remote audio files with audio playing, recording, and editing, using colored waveform displays for audio visualization
 - Multiplies the available sounds by searching for sounds produced by changing the playback speed of audio files; first audio retrieval system to offer this feature
- Created [FindSounds for Android](#), the first mobile app for audio Web search
- Engineered a unique monitoring system that can listen to any type of machinery and in real time, detect aberrant sounds that may indicate faults in the machinery

Research & Development in Programming Languages and Database Systems

- Led the design of **Simscript III**, an object-oriented programming language for computer simulation based on Simscript II.5 (2002-2005)
 - Collaborated with Nobel laureate Dr. Harry M. Markowitz, who created Simscript I and Simscript II in the 1960s
 - Helped to build the Simscript III compiler by reengineering the legacy Simscript II.5 compiler
- Designed and implemented the Simscript DataBase Connectivity (SDBC) feature, which enables Simscript programs to access relational databases (2001-2002); it is similar to, and patterned after, ODBC and JDBC
- Conducted an in-depth technical evaluation of commercial database management systems and text-retrieval systems and provided recommendations to the U.S. Department of Energy (1990)
- Co-invented Modsim, an object-oriented programming language for computer simulation based on Modula-2, and wrote the first Modsim compiler (1988)
- Led the team that created *SimGraphics II*, a cross-platform class library for drawing graphs and graphics, animating simulations, and providing graphical user interfaces (1989); this library gave Modsim and Simscript programmers the ability to “write once, run anywhere” several years before Java
- Developed a code generator for the Simscript II.5 compiler and a portable version of the Simscript II.5 run-time library (1987)
- Created *TED*, the first-known table editor for relational databases (1983); a table editor enables users to enter, edit, and delete rows of database tables and is today a standard component of database management systems (for example, the “datasheet view” in *Microsoft Access* is a table editor)
- Developed Oracle’s first SQL precompiler (1982)
 - 40th employee of Oracle, and first Oracle employee with a graduate degree in computer science (Oracle is today the second largest software company in the world and employs 108,000 people globally)
 - Worked with Oracle founders Larry Ellison and Bob Miner
- Designed and implemented the *Language Preprocessor* for the IBM DB/DC Data Dictionary (1981); this software product received an IBM award for its design

Research & Development in Optical Character Recognition (OCR) (1991-1999)

- Developed new performance measures for OCR systems, including character, word, and phrase accuracy, using novel sequence-comparison algorithms; these are described in my [doctoral dissertation](#)
- Created the *OCR Experimental Environment*, a unique software system with a distributed architecture for large-scale, automated testing of OCR systems
- Conducted for five consecutive years the internationally-recognized UNLV Annual Test of OCR Accuracy, the first large-scale independent evaluations of commercial OCR systems (links to test reports: [1996](#), [1995](#), [1994](#), [1993](#), [1992](#))
- Created the *ISRI Voting Machine*, the first OCR system to combine the outputs of multiple commercial OCR systems to produce a more accurate single output
- Published a research monograph entitled, *Optical Character Recognition: An Illustrated Guide to the Frontier*, which categorizes and depicts sources of error in character recognition; this book has influenced the development of [CAPTCHAs](#)

DESIGN ISSUES operational efficiencies

- Served on the Board of Advisors of the Federal Intelligent Document Understanding Laboratory of the U.S. Central Intelligence Agency

Teaching at the University of Mississippi (2003-2010)

- Twelve courses taught: *Computer Science I, II & III* (Java); *Programming in C++*; *Computer Simulation*; *Algorithms and Data Structures*; *Programming Languages*; *Database Systems*; *Compiler Construction*; *Analysis of Algorithms*; *Computer Audio*; *Pattern Recognition*
- Student evaluation of teaching: 300 responses to the question, “How would you rate the instructor’s overall performance in this course?” — 50% Superior, 32% Excellent, 13% Good, 4% Marginal, 1% Poor
- Coach of the University of Mississippi computer programming teams
- Supervised seven Master’s projects, five Master’s theses, and one Ph.D. dissertation
- Research collaborations with graduate students:
 - Resource modeling in computer simulation, with Chuck Jenkins
 - Real-time synthesis of acoustic Doppler effects for computer games, with Peter Sonnek
 - Raster graphic editor with a gesture interface using the Nintendo Wii remote, with Vincent Fermo
 - Synchronized playback of geocoded video recordings, with David Saulnier and Pramod Patlolla
 - Comparison of object-oriented programming languages, with Ben Pharr
 - Improving resource management in Java programs, with Derek Park
 - Performance analysis of minimum-spanning-tree algorithms, with Sedrick Stewart
 - Performance analysis of audio-compression algorithms, with Guangyan Li
 - Evaluation of MICA-mote wireless sensor nodes, with Alex Jaramillo
 - Survey of Telugu software, with Madhuri Dasari; Telugu is the official language in the state of Andhra Pradesh, India; e.g., తెలుగు ఆంధ్రప్రదేశ్, భారతదేశం రాష్ట్రంలో అధికార భాష

Other Teaching

- Visiting professor at Rhodes College in Memphis, Tennessee during the 2011-2012 academic year; four courses taught: *Computer Science I* (Python); *Computer Science III* (C++); *Operating Systems*; *Advanced Algorithms*
- Taught courses on computer usage and programming at San Juan College in Farmington, New Mexico, 1984-1986; about one-third of the students were from the Navajo reservation

Selected Publications

- Books:
 - S. V. Rice, G. Nagy, and T. A. Nartker, *Optical Character Recognition: An Illustrated Guide to the Frontier*, Kluwer Academic Publishers, Norwell, MA, 1999 ([link](#))
 - R. Belanger, B. Donovan, K. Morse, S. Rice, and D. Rockower, *Modsim: A Language for Object-Oriented Simulation*, CACI Products Company, La Jolla, CA, 1989
- Patent:
 - S. V. Rice and M. D. Patten, *Waveform Display Utilizing Frequency-Based Coloring and Navigation*, U.S. patent no. 6,184,898, Patent and Trademark Office, Washington DC, 2001 ([link](#))
- Journal articles:
 - S. V. Rice, H. Bunke, and T. A. Nartker, "Classes of Cost Functions for String Edit Distance," *Algorithmica*, 18(2), 1997
 - J. Kanai, S. V. Rice, T. A. Nartker, and G. Nagy, "Automated Evaluation of OCR Zoning," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 17(1), 1995
 - S. V. Rice, J. Kanai, and T. A. Nartker, "An Algorithm for Matching OCR-Generated Text Strings," *International Journal of Pattern Recognition and Artificial Intelligence*, 8(5), 1994
- Conference papers:
 - S. V. Rice and S. M. Bailey, "A System for Searching Sound Palettes," in *Proceedings of the Eleventh Biennial Symposium on Arts and Technology*, New London, CT, 2008 ([pdf](#))
 - S. V. Rice, "Braided AVL Trees for Efficient Event Sets and Ranked Sets in the Simgscript III Simulation Programming Language," in *Proceedings of the International Conference on High Level Simulation Languages and Applications*, San Diego, CA, 2007 ([pdf](#))
 - S. V. Rice, A. Marjanski, H. M. Markowitz, and S. M. Bailey, "The Simgscript III Programming Language for Modular Object-Oriented Simulation," in *Proceedings of the 2005 Winter Simulation Conference*, Orlando, FL, 2005 ([pdf](#))
 - S. V. Rice, "Frequency-Based Coloring of the Waveform Display to Facilitate Audio Editing and Retrieval," in *Proceedings of the 119th Convention of the Audio Engineering Society*, Paper #6530, New York, 2005 ([pdf](#))
 - S. V. Rice and S. M. Bailey, "A Web Search Engine for Sound Effects," in *Proceedings of the 119th Convention of the Audio Engineering Society*, Paper #6622, New York, 2005 ([pdf](#))
 - S. V. Rice, F. R. Jenkins, and T. A. Nartker, "The Fifth Annual Test of OCR Accuracy," presented at the Fifth Annual Symposium on Document Analysis and Information Retrieval, Las Vegas, NV, 1996 ([pdf](#))