

Leigh M. Smith, B.App.Sci, P.G.Dip (Comp.Sci.), Ph.D

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<http://www.leighsmith.com/Biography>

March 1, 2005

Summary

Permanent and contract employment since 1982 in systems analysis, programming, project management, personnel training, technical writing and system administration. Commercial application experience includes:

- Bank cryptography (DES, RSA), EFTPOS, smartcards.
- Language design and compiler construction, embedded systems, communications.
- Computer graphics, geographic/land information systems, GPS based aerial photography positioning systems.
- Music composition systems, video and audio DSP applications.
- Unix/Mach device driver development.

Research experience includes wavelet, DSP and AI applications, music psychology, computer music synthesis, interactive performance systems and analysis and modelling of musical rhythm. Part time work while researching has included a diverse range of academic programming, network system administration and tutoring positions.

Skills

- Software development in many languages including:

C, Objective C, C++ (APIs include MS Visual C++, Apple Cocoa, gcc POSIX)	22 years
Assembly Languages (includes Z-80, 80x86, 68HC11, 8051, 680x0, 56000)	23 years
Mathematica, Matlab, Octave	11 years
Smalltalk (Squeak)	4 years
Java (JDK1.1 API, Cocoa)	6 years
Python	4 years
Perl	10 years
awk, sed, m4, sh, zsh, csh shell-scripts	20 years
Common LISP (Gnu, Clisp), Scheme	21 years
SAS	10 years
- Project Leadership and Management.
- Research, Analysis and Development:
 - Object Oriented design.
 - Low latency real time systems design.
 - Multithreaded system design.
 - Digital Multimedia, video and audio signal processing.
 - Multiresolution (Wavelet) signal processing.
 - Artificial Intelligence, machine learning.
 - Public Key Cryptography.
 - Embedded Systems development.
- Software Product/Consumer focused design.
- Technical writing using \TeX , \LaTeX2e , HTML, SGML, DocBook, DSSSL, XML, RSS/Atom, Postscript.
- Systems administration.
- Open Source Project Development and Management.

Education

Doctor of Philosophy, Computer Science (Part Time) 1993–1999

University of Western Australia, Crawley, Western Australia (<http://www.csse.uwa.edu.au>)

Thesis Title: *A Multiresolution Time-Frequency Analysis and Interpretation of Musical Rhythm*

Researching the use of continuous wavelet transforms for time-frequency representations, to the task of emergent musical rhythm perception by computer. Full thesis and abstract at <http://www.leighsmith.com/Research>.

Postgraduate Diploma in Computing Science (Part time) 1990–1991

Curtin University of Technology, Bentley, Western Australia (<http://www.cs.curtin.edu.au>)

Thesis Title: *Surveys for Design Criteria of Interactive Computer Music Performance Systems*

Bachelor of Applied Science (Multidisciplinary Science) 1985–1988

Curtin University of Technology, Bentley, Western Australia (<http://www.cs.curtin.edu.au>)

Major: Computer Science.

Minor: Electronic Engineering.

Work Experience

Full Time Employment After Ph.D

Oz Music Code LLC., New York, U.S.A November 2002 to Present

Chief Technical Officer (MacOS X, Win32, Linux: Objective-C/C/C++; Cocoa; GNUstep; Altivec vector processing; Audio Unit API; Octave/Matlab; CVS, Subversion; MP3 codec)

- Designed and developed “Alphabet Soup” (<http://www.ozmusiccode.com/alphabetsoup>) — a low latency keyboard based sample and MP3 player/editor/signal processor consumer application.
- Developed “Seeker440” — an accurate realtime pitch detector Audio Unit plugin for instrument tuning.

Duggal Interactive & Tronic Studio, curated by Sebastien Agnessens, New York, U.S.A November 2002

Contract Software Engineer (Octave/Matlab; Objective-C/C; QuickTime Effects API)

- Developed “The Retail Experiment” (<http://www.leighsmith.com/PhotoAlbum/Exhibitions/Diesel>) — A real-time video installation at Diesel Denim Gallery, SoHo, New York. Luminance mask and faded captured still images into a prepared video stream using no external video processing hardware.

tomandandy Music Inc, New York, U.S.A March 1999 to September 2002

Software Designer, Project Manager and Lead Developer (MacOS X, Windows 2000, Linux: Objective-C/C++/C; Smalltalk; Python; Cocoa/GNUstep/CoreAudio/CoreMIDI/PortAudio APIs; Project Builder/Interface Builder IDE; Win32: Visual C++, DirectMusic, DirectSound APIs; CVS)

- Responsible for strategic technical design, technology adoption (API assessment and design), product design, evaluation and leverage of existing commercial and open source projects.
- Responsible for recruitment, training and management of five programmers. Responsible for liaison with technical and management staff at Apple Computer, M-Audio Inc. and open-source developers.
- Designer and lead developer of “Ennio” — a consumer application for automatically composing sound tracks to video, or video clips to music using automated analysis of video images extracting edits, motion and image tracking, and matching these against audio beats and phrases extracted from signal processing analysis of MP3 encoded music.

- Lead developer for the open-source MusicKit/SndKit (<http://www.musickit.org>) — cross-platform music representation and synthesis project in Objective-C & Python.
- Rewrite of a Smalltalk (Squeak) to Objective C bridge incorporating object persistence. Optimized the Smalltalk interpreter.
- Member of a development team writing “The Brain” — a music composition system.
- Developed CoreMIDI drivers for M-Audio for their MIDISPORT USB MIDI interface devices.
- Introduced intranet web serving for file and FAQ serving. Introduced version control procedures using CVS, cross-coast MacOS X-Server and RedHat Linux web and system administration, homogenous network upgrade, firewalling/VPN, QuickTime media streaming.

Part Time Employment During Ph.D Studies

tomandandy Music Inc, New York, U.S.A

December 1998 to January 1999

Contract Software Engineer (Mach kernel, C/Objective-C)

- Ported the NeXTStep Mach MIDI Driver (in C) from NeXT/Intel architectures to MacOS X-Server running on Intel and PowerPC architectures.

University of Western Australia, Perth, Western Australia

August 1994 to December 1998

Research Programmer, Tutor, System Administrator (Microsoft C; SAS; Java; Solaris/SunOS, Linux, Windows 95/NT, MacOS; samba, amanda, sendmail)

- Software maintenance and programming in Microsoft C for vision research in saccadic eye movements. Design and coding of an ECG wave measuring system in Microsoft C using a graphical digitiser and audio and visual feedback for rapid operator performance. Ad-hoc statistic queries and reports in the SAS statistical programming language for road accident research.
- Management of UWA’s Computer Science Department and Psychology Department vision laboratory academic networks of Solaris/SunOS, Linux, Windows NT, MacOS, OpenStep servers using NFS, PC-NFS and samba server applications with Linux, MacOS, Windows 3.11, Windows NT, and Windows 95 clients. Backup system design and implementation (amanda), sendmail script programming.
- Trained other system administrators on the administration of the Computer Science network. Lectured in artificial neural network architectures and applications. Tutored in fundamental and advanced algorithms, concurrent programming techniques and analysis. Demonstrated in Java application and applet programming.
- Research group WWW page authoring in HTML.

Full Time Employment After B.AppSc.

Comsys International Pty Ltd, Perth, Australia

June to August 1992

Contract Software Engineer (SunOS 4: ANSI C)

- Module development of a real time fiber optic cable monitor and maintenance system running on Sparcstation platforms.

GS Corporation Pty Ltd, Perth, Australia

December 1990 to June 1992

Contract Software Designer and Engineer (MS-DOS: Microsoft ANSI C; Solaris: POSIX, C, BSD socket library)

- Specification, design, programming and test design of a custom aerial photography positioning system in Microsoft C for the Department Of Lands Administration (W.A), interpolating shutter release times with GPS position.
- Conversion of graphics and peripherals drivers of a Geographic/Land Information System, GS-MAP, running under MS-DOS from device specific PGA graphics to the MetaWINDOWS “Menuet” device independent C graphics library.

- Maintained Solaris C networking software for distributed database applications on PC and Sun workstations communicating via NFS to Oracle and gatewayed Pick databases.
- Consulted on many technical aspects for the production of commercial quality software, including version control, future development paths and platforms, and further software improvements and features.

Jill Smith for Bristle Pty Ltd, Perth, Australia

October 1990

Technical Support (Irix)

- Customer support and problem solving for a graphic artist using a Personal IRIS graphic design package.

Gosh Leather Pty Ltd, Perth, Australia

September 1990

Contract Software Designer and Engineer (SNOBOL4)

- Development of a report conversion program between PC and Macintosh accounting applications in SNOBOL4.
- Consulted on the purchase of networking hardware and software for interconnection of Macintosh and PC systems.

Intellect Australia Pty Ltd, Perth, Australia

March 1988 to September 1990

System Designer, Software Engineer (Xenix, MS-DOS: Microsoft, Borland ANSI C; IAR, Introl C cross-compilers; 8051 and 68HC11 assembly language)

- Designed and developed a Xenix/MS-DOS C based proprietary microprocessor development system (macro assembler, preprocessor, linker, download utility) for developing programs for high security programmable PIN pads for EFTPOS applications.

Contracted to and working on-site at Intellect Australia from Super Software Pty Ltd.

- RSA encryption algorithms, key initialisation and downloading protocols, smart card communications, diagnostic boot ROMs, LCD handlers, asynchronous and synchronous communications drivers in C under MS-DOS and proprietary embedded hardware.
- Designer and lead developer of an IBM-PC based Encryption Key Management Facility in Microsoft C communicating with 4683 POS terminals and 4700 Financial security cards.
- Preparation and editing of programmer and user manuals.
- Performed on-site client personnel training and software maintenance at IBM, NCR, Fortronic and Commonwealth Bank corporations of PIN pad development systems, hardware and software architectures.

Development Operating Systems and Hardware

Unix

Linux (RedHat 8.0, Fedora, Debian 3.0)	i686
SunOS, Solaris	Sun Sparcstations
SCO SysV, Xenix	i486
NeXTStep/OpenStep/Mach/Rhapsody	m68k, i586, PowerPC
BSD 4.4 Unix, Ultrix	DEC PDP-11/VAX
Digital Unix V4.0	DEC Alpha
HP-UX	HP-9000 series
Irix	SGI Workstations

Microsoft

MS-DOS	i86-i386
OS/2	i286
Windows 3.1/9X/NT 4.0/2000/XP	i686

Apple

MacOS 6–10.3, MacOS X-Server (Mach/BSD Unix)	m68k, PowerPC
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Palm

PalmOS 3.5	m68k
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Embedded Systems

Proprietary real time executive systems	68HC11, 8051 SBCs
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Legacy Systems

AmigaDos	m68k
CP/M	Z80
RSTS/E, VMS	DEC PDP-11/VAX

Recent Publications

- [1] S. Brandon and L. M. Smith. Next steps from NeXTSTEP: MusicKit and SoundKit in a new world. In *Proceedings of the 2000 International Computer Music Conference*, pages 503–6, Berlin, 2000. International Computer Music Association. <http://www.musickit.org/Publications/ICMC2000.pdf>.
- [2] M. Delaney. *Laptop Music*, chapter 4, page 92. PC Publishing, 2004.
- [3] Keyboard Staff. Cool Tool. *Keyboard*, 30(2):13, February 2004.
- [4] Macworld Staff. Hot Stuff: The month's coolest developments. *MacWorld*, 20(12):128, December 2003. <http://www.macworld.com/2003/12/features/hotstuff/>.
- [5] L. M. Smith. Listening to musical rhythms with progressive wavelets. In *Proceedings of Tencon '96: Digital Signal Processing Applications*, volume 2, pages 508–13. IEEE, 1996.
- [6] L. M. Smith. Modelling rhythm perception by continuous time-frequency analysis. In *Proceedings of the International Computer Music Conference*, pages 392–5. International Computer Music Association, 1996. <http://www.leighsmith.com/Research/Papers/ICMC96.pdf>.
- [7] L. M. Smith. Comp muse: A perspective West. *Chroma*, 23:2–3, June 1998.
- [8] L. M. Smith. *A Multiresolution Time-Frequency Analysis and Interpretation of Musical Rhythm*. PhD thesis, Department of Computer Science, University of Western Australia, June 1999. <http://www.leighsmith.com/Research/Papers/MultiresRhythm.pdf>.
- [9] L. M. Smith and P. Kovesi. A continuous time-frequency approach to representing rhythmic strata. In *Proceedings of the Fourth International Conference on Music Perception and Cognition*, pages 197–202, Montreal, Quebec, August 1996. Faculty of Music, McGill University. <http://www.leighsmith.com/Research/Papers/ICMPC96.pdf>.