

JASVIR NAGRA

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Education

- **Doctor of Philosophy**—March 2001 - March 2006
University of Auckland, New Zealand
 - Under the supervision of Prof. Clark Thomborson, University of Auckland and Prof. Christian Collberg, University of Arizona
 - Dissertation titled “Thread-based Software Watermarking” on the development of a novel software watermarking technique based on multi-threading.
- **Bachelor of Science(Honors)**—March 1996 - November 1999
University of Auckland, New Zealand
 - Majored in Computer Science and Mathematics
- **Foundation in Science**—1995
University of the South Pacific, Fiji
 - Majored in Technology

Experience

- **Computer Science Department, University of Auckland**—March 2001 - Feb 2006
Research Assistant
 - Member of a team of four software architects led by Dr Christian Collberg. We developed SandMark, a general framework for software protection research. This Java tool contains obfuscation, watermarking, tamper-proofing functions and a large range of compiler analysis. Developed core framework and several obfuscation and watermarking techniques for this tool. Available:<http://sandmark.cs.arizona.edu/>
 - Developed and published Smirch, a tool that obfuscates perl programs using a very unusual syntactic obfuscation technique. Available:
<http://search.cpan.org/~jnagra/>
 - Developed a novel thread-based watermarking technique and a prototype tool for embedding, analyzing and recognizing thread-based watermarks in Java programs.
 - Developed an extension for Agave, a system for graph-based visualization of development of programs, that allows the visualization of the Java heap of a running program that could assist in reverse engineering an application. Also assisted in the building of a tool to visualize the development history of an application from CVS.
 - Researched and developed novel techniques for obfuscation and tamper-proofing of Java programs.
 - Researched the security of electronic voting including the potential pitfalls when auditing electronic voting software.

- **In co-operation with Dr Jubal John**—June 2006

Informal collaboration

- Began a survey on existing open-source health informatics toolkits with intent to evaluate the quality and functionality provided. The aim of this survey is to identify the largest gaps in the open-source software that currently exists and obstacles that prevent a more widespread adoption of such software in practice.
- Began preliminary research on the design for a process workflow system for hospitals.

- **Computer Science Department, University of Auckland**—March 2006 - current

Research Fellow

- Developed a technique for mounting a dynamic collusive attack against dynamic watermarks.
- Conducted research into obfuscation by misdirection with particular attention to e-voting.
- Guided and helped supervise three masters students doing research in watermarking and tamper-proofing.

- **Peace Software, Boston, USA**—March 2000 - March 2001

Systems Analyst and Programmer

- Assisted in design and developed billing software to manage deregulated supply of energy
- Optimized the interface between legacy client system and new solution

- **Computer Science Department, University of Auckland**—November 1999 - March 2000

Systems Analyst and Programmer

- Managed a lab with 250 computers running a mixture of Linux, Microsoft Windows and Apple Macintosh operating systems.
- Maintained and extended `NetAccount`, a tool used to authenticate and manage university-wide student access to the Internet.
- Developed and maintained scripts that managed and reported the financial revenue earned from departmental provision of Internet access to the rest of the University.

Teaching Experience

- **Systems Development: 2006**

A second year computer science paper covering the design of operating systems, computer architecture and data communications.

- **Computer Systems: 2004**

A second year computer science paper on the architecture of computer systems and an introduction to UNIX.

- **Computer Architecture: 2003**

A third year software engineering paper on the architecture of processors, memory organisation and caching. Included one lecture on digital rights management.

Skills

- **Operating Systems:** Linux (Gentoo, Ubuntu, and Debian), Mac OS 9 and X, UNIX (several variants), Windows 98/2000/XP
- **Computer Languages:**
 - Proficient in C, Java, L^AT_EX, Perl, XML, Scheme, X86 Assembler
 - Familiar with SQL, C#
- **Tools and Systems:**
 - Proficient in Apache, BIND, CVS/RCS, Make, GnuPG, SSHD, Emacs
 - Familiar with Kerberos, tcpdump, NFS, OpenSSL, Postfix, etherreal

Publications and Talks

- **Collusive Attacks Against Software Watermarks**
Jasvir Nagra
To be published in Proc. of IEEE TENCON2006, November 2006.
Describes a framework for performing collusive static and dynamic attacks against fingerprinted software and presents the results of mounting such attacks against Collberg-Thomborson (CT) watermarks.
- **Threading Software Watermarks**
Jasvir Nagra and Clark Thomborson
Proc. 6th International Workshop on Information Hiding (IH2004), 2004.
Describes a novel system for automatically protecting software by making a program highly multi-threaded while encoding in it a watermark.
- **How to watermark software with threads**
Jasvir Nagra
Cloakware, Canada, May 2004.
Presented a talk on how Java threads can be used to watermark software presented to Cloakware. Cloakware is one of the world's leading companies in software protection and anti-tampering technologies.
- **Tamper-proofing Software Watermarks**
Clark Thomborson, Jasvir Nagra, Ram Somaraju and Charles He
ACM Workshop on Digital Rights Management (DRM2003), 2003.
Describes a novel technique for protecting dynamic watermarks by building dependence between the watermark and constants in a program.
- **A system for graph-based visualization of the evolution of software**
Christian Collberg, Stephen Kobourov, Jasvir Nagra, Jacob Pitts and Kevin Wampler
ACM symposium on Software Visualization (SOFTVIS2003), 2003.
Describes a new tool for visualization the history of a projects development as temporal graphs.
- **Esoteric Regular Expressions**
Jasvir Nagra
Auckland Perl Mongers, Apr 2005.
Presented a talk on the esoteric features of the `perl` regular expression engine, showed the `perl` regular expression was not regular and how it could be used to perform arithmetic.

- A Functional Taxonomy for Software Watermarking
Jasvir Nagra, Clark Thomborson and Christian Collberg
Twenty-Fifth Australasian Computer Science Conference (ACSC2002), 2002.
Outlines a taxonomy of existing watermarking techniques based on their use and properties.
- Implicit communication between agents in the RoboCup domain
Jasvir Nagra
Tech Report, Department of Computer Science, University of Auckland, 1999.
Describes a method of using non-explicit channels to communicate between autonomous robots.

Conference and Journal Reviewing

- Reviewed papers for:
 - Journal of Research and Practice in Information Technology, 2006
 - Conference on Information Hiding, 2005
 - Conference on Information Hiding 2004

Patents

- Jasvir Nagra and Clark Thomborson, "Method Of Introducing Digital Signature Into Software", US Patent pending, 2005.
- Clark Thomborson, Yong He, Ram Somaraju and Jasvir Nagra, "Tamper-proofing watermarked computer programs", US Patent pending, 2004.

Other Achievements

- Toastmasters national public speaking champion of New Zealand, 2005. Third place in the semi-finals of the World Championship, 2005.
- President of Varsity Toastmasters Club, 2004
- Member of the team of three programmers who placed second at the South Pacific Programming Contest 2001
- Co-founded the Sustainability Think-tank, a university initiative to involve students and businesses in finding more sustainable and economically attractive business processes, 2005.
- Member of IEEE, SPIE and ACM

Referees

- Dr. Christian Collberg,
Department of Computer Science,
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1040 E. Fourth St.,
Tucson, AZ 85721-0077.
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- Dr. Patricia Riddle,
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