

ALAN WASSYNG, Ph.D., P.Eng.

Director, McMaster Centre for Software Certification (McSCert)
Acting Director, Software Quality Research Laboratory (SQRL)
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1280 Main Street West, Hamilton, Ontario L8S 4K1
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EDUCATION

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| Ph.D. | 1979. | "The Solution of Large Systems of Linear Algebraic Equations with Applications in Boundary Element Methods" |
| M.Sc. | 1974. | "The Motion of Record Styli & Distortion in Hi-Fi Turntable Systems" |
| B.Sc. (Hons) | 1972. | (Applied Mathematics) |
| B.Sc. | 1971. | (Applied Mathematics, Mathematics) |
- These degrees were awarded at the University of the Witwatersrand, Johannesburg, South Africa.

EMPLOYMENT

- Associate Professor, Department of Computing and Software, 2002 – present.
- President, Alan Wassyng Consulting Ltd., 1987 – present.
- Visiting Assistant Professor, Dept. of Civil & Mineral Engineering, University of Minnesota, 1979 – 1986.
- Junior Lecturer/Lecturer, Department of Applied Mathematics and Computer Science, University of the Witwatersrand, 1973 – 1979.

FUNDING AT MCMASTER UNIVERSITY

- NECSIS is a recently announced Automotive Partnership Canada project on model-driven software development for automotive applications. The Principal Investigators for this project are Tom Maibaum (McMaster) and Jo Atlee (Waterloo). The project will be led out of McMaster. Together with Mark Lawford and Tom Maibaum at McMaster, and Sebastian Fischmeister at Waterloo, I am involved in the real-time and safety aspects of the project. Eight universities/research organizations are involved in this \$16.5M project.
- Together with Tom Maibaum and Mark Lawford, I originated a software certification initiative that led first to the creation of a North American wide Software Certification Consortium (SCC), and then eventually to an Ontario Research Fund – Research Excellence award on Software Certification for Safety-Critical Systems. This \$21M project was funded in June 2009, and involves Legacy Systems International, Biosign Technologies, Systemware Innovation, OPG, AECL, AMD, QNX and CIMIT as industry partners, researchers at Waterloo and York Universities, and fifteen of our colleagues at McMaster. This project is led by McMaster, with Tom Maibaum, Mark Lawford and myself as the Principal Investigators at McMaster. A direct consequence of this funding was the Senate approved creation of the McMaster Centre for Software Certification (McSCert). I am the inaugural Director.
- Together with colleagues in Computing and Software, Tom Maibaum, Mark Lawford and Jacques Carette, and with colleagues in the Humanities, primarily John Connolly, we helped the VP of Research, Mo Elbestawi, create “Eight”, the Hamilton Institute for Interactive Digital Media. Eight has been formed through a partnership comprising McMaster, Silicon Knights, the Art Gallery of Hamilton and Mohawk College. Silicon Knights has pledged \$1.5M cash and \$3.5M in-kind support for Eight. IBM has recently joined the partnership.
- IBM Shared University Award for “Smarter Transportation”. This is an unsolicited award and is mainly equipment based at this stage. The award was made to investigate the use of multi-core processors for onboard processing in cars of the future. I am the Principal Investigator.
- Canada Foundation for Innovation – Leadership Opportunity Fund. Tom Maibaum, William Farmer and I were awarded a \$257,000 CFI-LOF to create the *Visual Design And Analysis Laboratory* – a wall of 4-by-3 Apple 30 inch cinema displays used to display large, complex, high-resolution images of software specification and design, analysis and verification artifacts.

SELECTED INVITED TALKS

- A. Wassyng, T. Maibaum, M. Lawford, “Software Certification: The Case Against Safety-Cases”, at the *Monterey Workshop*, Redmond, USA, April 2010.
- A. Wassyng, “Software for Medical Devices – Why Testing is Not Enough”, *Canadian Organization of Medical Physicists 2010 Winter School on Safety and Quality in Radiation Oncology*, Banff, January 2010.
- A. Wassyng, "Developing Safety-Critical Software – An Integrated Methodology", *University of Waterloo*, Waterloo, July 2008.
- A. Wassyng, "Developing Safety-Critical Software with Certification as a Priority", *Royal Military College Canada*, Kingston, July 2007.
- A. Wassyng, T. Maibaum “Software Certification - Necessity or Opportunity?”, IBM, July 2007.
- A. Wassyng, "A Comprehensive Table-Based Methodology for Developing Safety-Critical Software", *Airbus*, Bristol, U.K., August 15, 2006. (3 hours)
- A. Wassyng, "Integrated Methods and Tools for Safety-Critical Software Development", *Guidant Corp.*, Minnesota, U.S.A., June 16, 2006.
- A. Wassyng, M. Lawford, “A Proposed Initiative on Software Certification”, *Software Quality Research Laboratory, University of Limerick*, July 26, 2005.
- A. Wassyng, “Safety-Critical Software Development – Requirements Based”, *Requirements Engineering Day, University of Waterloo*, April 2005.
- A. Wassyng, “Engineering High-Quality Software Applications”, *Keynote presentation at the Canadian Undergraduate Software Engineering Conference (CUSEC)*, Concordia University, January 2005.
- A. Wassyng, “A Comprehensive Methodology for Developing Safety-Critical Software”, *AIST, Centre for Verification and Systems, Amagasaki, Japan*, November 2004.
- Panelist, “On the Need for Improved Methods, Models, and Languages in Tool-Based Software Development”, at *3rd CUE Workshop*, Baden, October 2004. Panel members: M. Broy, I. Lee, Shankar, J. Sifakis, A. Wassyng, moderated by C. Heitmeyer.
- A. Wassyng, “Integrated Tools for Integrated Methods”, at the *Monterey Workshop, Baden*, October 2004. Attendance was by invitation only.
- A. Wassyng, G. Moum, M. Thomas, “Industrial Needs in Software Engineering”, at *1st CUE Workshop*, Macau, October 2002. Attendance at the workshop was by invitation only.

TRAINING OF HIGHLY QUALIFIED PERSONNEL

Since returning to academia in 2002 (most are co-supervised): Current – 2 post-doctoral fellows; 3 Ph.D., students; 7 Master’s students. Completed – 1 Ph.D., student; 9 Master’s students; 17 undergraduate summer research assistants.

SELECTED PROFESSIONAL SOFTWARE DEVELOPMENT

- Senior member of the team responsible for the development of “Shutdown System 1” (SDS1) software for Ontario Power Generation’s Darlington Nuclear Generating Station during the “Redesign Project” (1994 - 1997) and “Loss of Flow Project” (1998 - 2002). This safety-critical software represents the last line of defence in the case of a malfunction in the nuclear plant.
 - ♦ Authored the formal requirements documents for the SDS1 Trip Computers.
 - ♦ Senior member of the verification team – involved in mathematical verifications of the software design and the code, expert reviews and testing.
 - ♦ Helped develop Safety-Critical Software development process at OPG, 1991 - 1998.
- Developed real-time applications for Scada operations and pressure tube fatigue monitoring in nuclear generating stations for Ontario Hydro. 1995 - 1997.
- Consultant to AECL for development of the shutdown software for the Wolsong reactors. 1992 - 1994.
- Together with Glenn Archinoff and Dave Parnas, developed system level and software requirements for an example project for the Atomic Energy Control Board. 1994 - 1995.
- Designed and implemented a completely automated backup system over modem lines. 1987-1990.

RESEARCH SERVICE

- Co-founded the Software Certification Consortium in 2007.
- Program committee member for: ISoLA 2004, FM 2005, FSEN 2005, FM 2008, ICTAC 2008, SCORE 2009, ISoLA 2010 and SCORE 2011.
- Organizing committee member for: ACSD 2004 (chair), FM 2006, CertSoft 2006 (chair).
- Reviewer for: IEEE Transactions on Software Engineering, ACM Transactions on Software Engineering and Methodology, Fundamenta Informaticae and IEEE Software.

AWARDS & RECOGNITION

- In January 2010, the U.S. Nuclear Regulatory Commission selected 10 “experts” from a pool of 70 world wide to guide the planning of regulatory research in digital I & C safety systems. I was one of those 10.
- 2006 McMaster Students Union Teaching Award for the Faculty of Engineering.
- New Technology Award, Development of Safety-Critical Software Engineering Technology, OPG, 1995.
- 1990 Merl K. Miller Award (Computers in Education Journal); shared with Karl Smith and Sam Sharp.
- Recognition letter from Ontario Hydro for Contributions to obtaining a Licence to Operate for Unit 2 at the Darlington Nuclear Generating Station, 1989.

SELECTED PUBLICATIONS

- Wassying A., Maibaum, T., Lawford, M., “On Software Certification: We Need Product-Focused Approaches”, *C. Choppy and O. Sokolsky (Eds.): Monterey Workshop 2008*, LNCS Vol. 6028, 250-274, Springer, 2010.
- N. Aguirre, M. Frias, M. Moscato, T. Maibaum, A. Wassying, "Describing and Analyzing Behaviours over Tabular Specifications Using (Dyn)Alloy", *12th International Conference on Fundamental Approaches to Software Engineering (FASE 2009)*, LNCS Vol. 5503, 155-170, Springer, 2009.
- X. Hu, M. Lawford, A. Wassying, “Formal Verification of the Implementability of Timing Requirements”, *In D. Cofer and A. Fantechi (Eds) Proceedings of FMICS 2008: International Workshop on Formal Methods in Industry Critical Systems*, LNCS Vol. 5596, 119-134, 2009.
- T. Maibaum, A. Wassying, “A Product-Focused Approach to Software Certification”, *IEEE Computer*, 91-93, February 2008.
- J. Hatcliff, M. Heimdahl, M. Lawford, T. Maibaum, A. Wassying, F. Wurden, “A Software Certification Consortium and its Top 9 Hurdles”, *Proceedings of SafeCert 2008*, part of ETAPS 2008, Budapest, 2008.
- A. Wassying, M. Lawford, “Software Tools for Safety-Critical Software Development”, *International Journal of Software Tools for Technology Transfer*, Special Section The Industrialisation of Formal methods: A View from Formal Methods 2003. Vol. 8, Number 4-5, 337-354, Springer, August 2006.
- R. Janicki, A. Wassying, “Tabular Expressions and Their Relational Semantics”, *Fundamenta Informaticae*, Vol. 68, 1-28, 2005.
- A. Wassying, M. Lawford, X. Hu, “Timing Tolerances in Safety-Critical Software”, In J. Fitzgerald, I.J. Hayes, and A. Tarlecki, eds. *FM 2005: International Symposium of Formal Methods Europe Proceedings*, Newcastle, U.K., LNCS Vol. 3582, 157-172, Springer-Verlag, July 2005.
- A. Wassying, R. Janicki, “Using Tabular Expressions”, In *Proceedings of International Conference on Software and Systems Engineering and their Applications*, Paris, Vol. 4, 1-17, December 2003.
- A. Wassying, M. Lawford, “Lessons Learned from a Successful Implementation of Formal Methods in an Industrial Project”, In K. Arakai, S. Gnesi, and D. Mandrioli, eds. *FME 2003: International Symposium of Formal Methods Europe Proceedings*, Pisa, Italy, LNCS Vol. 2805, 133-153, Springer-Verlag, Sept. 2003.
- G.H. Archinoff, R.J. Hohendorf, A. Wassying, B. Quigley, M.R. Borsch, “Verification of the Shutdown System Software at the Darlington Nuclear Generating Station”, *Proceedings of the International Conference on Control & Instrumentation in Nuclear Installations*, Glasgow, May 1990.
- A. Wassying, S. Sharp, K. Smith, "Personal Computers and Modeling in Engineering Education", *CoED Journal*, Vol. X No. 1, pp. 31-46, January - March 1990. (Winner of the 1990 Merl K. Miller Award.)
- A. Wassying, "Solving $Ax=b$: A Method with Reduced Storage Requirements", *SIAM Journal on Numerical Analysis*, Vol 19, No. 1, 197-204, 1982.