

Gerard J. Holzmann

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Areas • Software reliability/safety, static source code analysis, code review, formal verification, concurrency, distributed systems, logic model checking, software engineering, software tools.

U.S. National Academy of Engineering (2005), JPL Fellow (2007), ACM Fellow (2012), TS/SCI (2017).

Education

Ph.D. Technical Sciences, June 1979, Delft University of Technology, The Netherlands

Title: *Coordination Problems in Multiprocessing Systems*. Delft University, 1979.

Thesis advisers: Prof. W.L. van der Poel (Math/CS) and Prof. J.L. de Kroes (EE).

M.Sc. (1976), and B.Sc (1973) EE. Delft University of Technology, The Netherlands.

Employment

2017- Visiting Associate Faculty (Computer Science), Caltech CMS.
2017- Founder and Researcher Nimble Research, Monrovia, CA.
2012-2017 Senior Faculty Associate in Computer Science, Caltech CMS.
2007-2012 Faculty Associate, Caltech CS.
2007-2017 Fellow, NASA/JPL.
2005-2017 Senior Research Scientist, NASA/JPL.
2003- Lecturer (2003-06, 2008-10, 2013, 2015, 2017), Caltech CS.
2003-2017 Principal Computer Scientist, NASA/JPL.
2003-2017 Chief Scientist Laboratory for Reliable Software, NASA/JPL.
2001-2003 Director Computing Principles Research, Bell Labs, CS Research.
1995-2001 Distinguished Member of Technical Staff, Bell Labs, CS Research.
1983-1995 Member Technical Staff, Bell Laboratories, Murray Hill, NJ, CS Research.
1981-1983 Assistant Prof., Delft University of Technology, The Netherlands. EE.
1980-1981 Member Technical Staff, Bell Laboratories, Murray Hill, NJ, CS Research.
1979-1980 Fullbright scholarship, USC, host: Per Brinch Hansen, Los Angeles, CA.

Teaching

2003- CS118 Software Verification and Logic Model Checking, CalTech CMS.
2009-16 Short courses in Flight Software Certification, for developers at JPL.
2010-13 Short courses on Safety-Critical Software Design, Northrop Grumman Corp.
2005-12 Short courses in Software Risk, for senior management at JPL.
1991-96 Course in Formal Verification, Royal Institute of Techn., Stockholm, Sweden.
1991 Course in Formal Verification, Columbia University, New York, Visiting Prof., EE.
1989 Course in Formal Verification, Princeton University, Associate Prof., CS.
1982 Course in Data Communications, Delft University, The Netherlands.

- 1981 Short course on concurrent systems, for the Math. Center at Bell Labs.
1980 Graduate course, Operating Systems, USC CS, Los Angeles, CA.

Clearance

Current top secret clearance (TS/SCI).

Awards, Honors

- 2016 Named one of ten "Dutch Superheros in IT" by Intermediar (Nov. 2016)
- 2015 IEEE Harlan D. Mills Award
"For fundamental contributions to improving software quality, in particular through model checking tools and coding standards, and for successfully transferring these contributions to practitioners developing mission-critical software."
- 2013 NASA Software of the Year Award
Mars Science Laboratory (MSL), Flight Software Team (Nov. 2013)
- 2013 NASA Group Achievement Award, MSL Flight Software Team (Oct. 2013)
"For outstanding achievement in the design and development of the Mars Science Laboratory Flight Software."
- 2013 JPL Research Poster Conference Award Winner (Jan. 2013)
"Verification methods and structuring principles for reliable software development"
- 2012 NASA Exceptional Engineering Achievement Medal (Oct. 2012)
"for exceptional and sustained achievement in developing and infusing advanced engineering practices for the verification of mission-critical software"
- 2012 ACM Fellow (June 2012)
"for contributions to software verification by model checking"
- 2011 NASA Group Achievement Award
Toyota Unintended Acceleration Assessment Team (Oct. 2011)
"for outstanding technical expertise and dedicated support to the NASA Engineering and Safety Center's investigation of unintended acceleration in Toyota vehicles"
- 2009 NASA Space Act Award (Aug. 2009)
"for the development of a significant scientific or technical contribution, entitled Support for systematic code reviews with the Scrub tool"
- 2007 JPL Fellow (April 2007)
"in recognition of his outstanding leadership and technical contributions in the development of reliable software systems, in pioneering the application of logic model checking techniques to software verification and in infusing these techniques in the development of increasingly complex space missions"
- 2006 Doctor Honoris Causa, Twente University, The Netherlands (Dec. 2006)
- 2006 ACM Kanellakis Theory and Practice Award (with Kurshan, Vardi, and Wolper, May 2006)
"for the development of automata-theoretic techniques for reactive-systems verification, and the practical realization of powerful formal-verification tools based on these techniques"

- 2005 Elected member US National Academy of Engineering (Oct. 2005)
"For the creation of model checking systems for software verification"
- 2003 Thomas Alva Edison Patent Award, R&D Council of NJ (Nov. 2003)
"for Methods and Apparatus for testing event driven software, US Patent 6,353,896"
- 2002 ACM SIGSOFT Outstanding Research Award (Orlando, May 2002)
- 2001 ACM Software Systems Award for the *Spin* model checker (Toronto, April 2002)
"for the Spin verification system, a highly successful and widely used model-checking software system based on formal methods from Computer Science. Spin has made advanced theoretical verification methods applicable to large and highly complex software systems"
- 2000 Best paper award Bell Labs Technical Journal
- 1998 Best paper award ICRE Conference
- 1995 Distinguished Member of Technical Staff Award, Bell Labs
- 1981 Prof. Bähler Prize for best Dutch Ph.D. thesis 1975-1980 in Telecomm., 1st recipient
- 1979 Fulbright-Hayes Scholarship

General Service

- 2015 Panel Member for National Academy, review of NIST IT Lab.
- 2015 Peer reviewer, National Academy of Engineering, DOT report.
- 2015 Co-Chair 7th NASA Formal Methods Symposium, April 2015, Pasadena, CA.
- 2014 - Editor *IEEE Software*, Reliable Software.
- 2011 - 2012 Scientific Advisory Board, NECSIS, Canada. (NECSIS=Network for Eng. of Software Intensive Systems for Automotive Applications)
- 2011 Invited expert, US Nuclear Regulatory Committee hearing, Washington DC, 2/1/2011.
- 2011 - 2013 Consultant, software reliability, Hospira Inc., Morgan Hill, CA.
- 2011 Co-Chair, 3rd NASA Formal Methods Symposium, Pasadena, CA.
- 2010 - 2011 Investigation of possible software causes for *Toyota sudden unintended acceleration* for NHTSA/DOT and NASA/NESC (see Significant Projects, below).
- 2010 Invited expert US Nuclear Regulatory Committee Panel on software safety.
- 2009 - 2011 Science and Technology Advisory Committee (STAC), JPL.
- 2009 - Fellow Promotion Advisory Board, JPL.
- 2008 - 2011 Peer Committee Member, Computer Science and Engineering, NAE.
- 2008 - Editor *Int. Journal of Critical Computer-Based Systems*, Interscience Publishers.
- 2007 - 2011 Annual *NASA Software of the Year Selection* Committee for JPL.
- 2006 - *Software Reliability Leadership Council*, Division 31, JPL.
- 2006 - 2008 Co-chair nominating committee CS, (chair: Charles Simonyi), NAE.
- 2006 Evaluation team *Software Process*, NASA Kennedy Space Center.
- 2006 - 2010 NASA/SBIR technical mentor, for Grammatech static analysis development.
- 2005 - 2010 Small Business Innovation Research (SBIR), Selection Board, JPL.
- 2005 - Editor *Innovations in Systems and Software Engineering*, Springer Verlag.
- 2003 Software Peer Review Board, Jupiter Icy Moons Orbiter Mission, JPL.
- 2003 - Steering committee, Runtime Verification Workshop Series.
- 2003 - Alternate JPL Representative for Software, NASA Engineering Safety Center (NESC).

- 2001 - Chair advisory board, Spin Workshop Series (held annually since 1995).
- 2001 - 2003 Lead strategist *Software Quality Research* at Lucent / Bell Labs.
- 2000 - Editor *Software Tools for Technology Transfer*, Springer Verlag.
- 2000 - 2003 Team lead *Software Review* for *Bell Labs Technical Journal*.
- 1997 Reviewer NASA Guidebook on Verification of Software and Computer Systems Vol. II.
- 1996 - 2006 Editor *Formal Methods in Systems Design*, Kluwer Academic Publ. (journal).

Software Tools

A focus of my work is the design of tools that can bridge the gap between theory and practice in the area of software analysis, test, and verification. Most tools I designed and implemented are generally available. Some have a significant user base (e.g., spin, ispin, swarm, scrub, uno, and ncsl).

2016	<i>cobra</i>	a source code analysis tool for development and peer code review.
2015	<i>tau</i>	formal analysis of tiny automata, interfacing to spin
2015	<i>buzz</i>	a modular framework for model checking algorithms
2011	<i>ispin</i>	a graphical user-interface to Spin and Swarm.
2009	<i>scrub</i>	a code review and analysis tool, used in many JPL projects and missions.
2008	<i>swarm</i>	search diversification, randomization, and parallelism for Spin verifications.
2006	<i>ncsl</i>	a basic source code counter.
2006	<i>gh_cpp</i>	a pre-processor for C, with checks for a subset of the MISRA coding rules.
2001	<i>uno</i>	a property-based lightweight static source code analyzer for ANSI-C.
1999	<i>catch</i>	a yacc-like parser for grammars describing event-driven systems.
1998	<i>modex</i>	automated <i>spin</i> model extraction system for C code (patent 2002), making it possible to verify implementation level code.
1996	<i>sweep</i>	a model checking system for the μ -calculus, supporting ctl* and ctl.
1995	<i>ubet</i>	requirements capture tool, productized by Lucent (patent 1998).
1993	<i>hype</i>	previewing tool for displaying troff output, with support for hypertext links.
1992	<i>v1</i> and <i>v2</i>	two simple Gentzen-style resolution theorem proving systems.
1991	<i>uapi</i>	an implementation of a Java-like system (patent issued 1998).
1989	<i>spin</i>	logic model checking system for the verification of concurrent systems.
1988	<i>sdlvalid</i>	first automated verification system for specifications written in SDL. this tool preceded the commercial SDL verification tools by several years.
1987	<i>supertrace</i>	first implementation of a novel proof approximation technique; this algorithm is today used in most logic verification systems.
1984	<i>pico</i>	early image editing system for digital photography (patent issued 1992).
1983	<i>trace</i>	a revised verification system based on automata and graph theory.
1980	<i>pan</i>	early automated verification system for communications protocols, based on a process algebra for message passing systems.

Significant Projects

- 2008-2012 Participated as a member of the flight software team for the Mars Science Laboratory missions, delivering a one-ton rover (Curiosity) to the surface of Mars -- focusing on code review process, coding standards, and software robustness.
- 2010-2011 JPL team-lead selected by NASA, performing in-depth analysis to identify possible software causes for *sudden unintended acceleration* in Toyota vehicles, reporting to the U.S. Department of Transportation (DOT) and the NASA Engineering and Safety Center (NESC). Most of the results remain confidential.
- 2009-2014 Computational Modeling and Analysis of Complex Systems *NSF Expeditions* project, <http://cmacs.cs.cmu.edu/>
Description: "*Gain fundamental new insights into the emergent behavior of complex biological and embedded systems through the use of revolutionary,*

- highly scalable and fully automated modeling and analysis techniques."*
 Colleagues include: Ed Clarke, Patrick Cousot, and initially also Amir Pnueli.
- 2005-2006 Reliable Software Systems Development (JPL)
 Project funded under the NASA Office of Exploration Systems (OExS).
 Aimed to improve the reliability of mission and safety critical software for space exploration.
 The odds of winning this funding was less than 3%; the initial amount awarded was the maximum possible at \$15M, and \$5 Million *more* than requested.
- 1998-2000 PathStar (Lucent)
 Formal verification of the full call processing and class-5 feature code for the PathStar Access Server, using the model extraction tool *feaver* and *spin*.
 Verification system tracked evolving code from initial design through product delivery with daily verification runs. A web-based system gave developers access to all verification results. Built a 16-CPU server to perform all verifications.
 Over 200 requirements checked. Uncovered 10 times more software defects in this code than the regular testing team, with 10 times fewer people (2 instead of 20).
- 1990-1992 NewCoRe (AT&T)
 Formal verification of a core piece of commercial call processing software: the 5ESS ISUP protocol, coded in SDL as a central part of the implementation of SS7.
 The verification team pursuing this approach consisted of 4-5 people.
 Verification of 145 requirements, over 10,000 verification runs in a two year period, using the verification tool that I built for this project (*sdlvalid*).
 Uncovered a total of 112 serious defects in the initial design of the ISUP code.

Patents

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|------|---------------------|--|
| 2004 | US Patent 6,804,634 | automatic generation of a covering test case set from model |
| 2002 | US Patent 6,353,896 | method and app. for testing event driven software, w. Ken Thompson |
| 2000 | US Patent 6,061,812 | generating passive testers from LTL properties, w. Mihalis Yannakakis |
| 1998 | US Patent 5,826,017 | general protocol for data communications (a java-like system) |
| 1998 | US Patent 5,812,145 | message sequence chart analyzer, w. Doron Peled |
| 1997 | US Patent 5,615,137 | on the fly model checking with partial order reduction, w. Doron Peled |
| 1996 | US patent 5,559,904 | deriving width and height information from raw image files |
| 1992 | US patent 5,129,013 | graphics image editing system |

Patent 6,353,896 received the 2003 Thomas Alva Edison Patent Award in the Information Technology Category from the Research and Development Council of New Jersey. Five other patent applications are pending.

Books

- 2004 *The Spin Model Checker, Primer and Reference Manual*, Addison-Wesley.
 Theoretical foundation and practical application of logic model checking techniques.
- 1995 *The Early History of Data Networks*. IEEE Computer Society Press. (w. Bjorn Pehrson)
 A comprehensive history of pre-electric long distance communication methods.
- 1991 *Design and Validation of Computer Protocols*. Prentice Hall.
 One of the first books on automated protocol verification.
 A Japanese translation of the book was published in 1994.
- 1988 *Beyond Photography, The Digital Darkroom*. Prentice Hall.
 One of the first books on digital photography; coining the term "digital darkroom."
 The book was featured on CNN in 1989 in the Science & Technology report. In 1992 it led to a permanent installation, demoing the software, at Liberty Science Museum, near New York.

Chapters in Books

- 2013 Explicit state model checking, In: Handbook of formal methods.
Eds. E. Clarke et al. (to appear).
- 2012 Conquering Complexity,
In: Conquering Complexity (book title), Eds. Mike Hinchey and Lorcan Coyle.
Publ. Springer Verlag, March 2012.
- 2005 Software Model Checking with Spin.
In: *Advances in Computers*, Vol 63, Ed. M. Zelkowitz,
Publ. Elsevier, Amsterdam, The Netherlands

Proceedings Edited

- 2015 *Proc. 7th NASA Formal Methods Symposium.*(Editor, w. K. Havelund, and R. Joshi), Pasadena, April 2015, Springer Verlag, LNCS Vol. 9058.
- 2011 *Proc. 3rd NASA Formal Methods Symposium.*(Editor, w. M. Bobaru, K. Havelund, and R. Joshi), Pasadena, April 2011, Springer Verlag, LNCS Vol. 6617.
- 1996 *The Spin Verification System.* (Editor, w. J-C. Gregoire and D. Peled), Vol. 32, American Mathematical Society, DIMACS series, 1997, ISBN 0-8218-0680-7, 203 pgs.
- 1996 *Partial Order Methods in Verification.* (Editor, w. V.R. Pratt and D. Peled), Vol. 29, American Mathematical Society, DIMACS series, 1997, ISBN 0-8218-0579-7, 403 pgs.

Invited Tutorials and Courses

- 2013 Proving Properties of Concurrent Programs,
First Spin Symposium / 20th Spin Workshop, Univ. of NY, Stony Brook, July 2013.
- 2005 Model Checking and Model Extraction with Spin,
(with Theo Ruys) 12th Spin Workshop, San Francisco, CA, August 2005.
- 2004 Advanced SPIN Tutorial,
(with Theo Ruys), SPIN 2004 Workshop, Barcelona, Spain, April 2004.
- 2002 Software Model Checking (2 lectures)
Concordia Summer School in Telecommunications Software Engineering.
August 26-29, 2002, Montreal, Canada.
- 2000 A two-week Course on Software Model Checking,
NATO Summer School, Marktobendorf, Germany, Aug. 2000.
(Other lecturers: Amir Pnueli, C.A.R. Hoare, Joachim Parrow, Simon Peyton Jones.)
- 2000 Software Model Checking with Spin (half day tutorial),
FSE-8, ACM SigSoft 8th Int. Symp. on the Foundations of Software Engineering,
San Diego, Ca., Nov. 2000. (Other lecturer: E.A. Emerson.)
- 1998 Automata Based Model Checking (tutorial),
WIFT98, Workshop on Industrial Strength Formal Techniques,
Boca Raton Fl. USA, October 1998.
- 1998 Software and Hardware Model Checking (tutorial with A. Puri),
ASE98, Automated Software Engineering Conf., Honolulu Hawaii USA, October 1998.
- 1996 1-week Course on On-the-fly Model Checking,
BRICS Autumn school on Verification,
Inst. for Basic Research in Computer Science, Aarhus, Denmark, Oct. 1996.
(Other lecturers: Ed Clarke, David Basin, Tom Melham.)
- 1995 Proving Properties of Concurrent Systems with Spin (half-day tutorial)
CONCUR95, 6th Intern. Conf. on Concurrency Theory,
Philadelphia, Pa., USA, August 1995.
- 1993 Design and Validation of Communication Protocols (half day tutorial),
ICNP93, First IEEE Int. Conference on Network Protocols,
San Francisco, Oct. 1993.

1991 Design and Validation of Protocols (one day tutorial)
9th IFIP/INWG 6.1 Conf. on Protocol Specification, Testing and Verification,
Stockholm, Sweden, June 1991.

Invited Talks at Universities, etc.

2016 Computer Science Colloquim, Oct. 13, Harvey Mudd College, Claremont, CA.
2015 Distinguished Lecture Series, Oct. 27, CMU West, Sunnyvale, CA.
2014 Howard and Jan Oringer Seminar, Caltech CMS, April 15.
2013 Princeton Univ., Aug. 27, Horizons in Theoretical Computer Science.
2012 Google, Venice, Dec. 13.
2012 Caltech IST Advisory Council Meeting.
2012 Distinguished Speaker Series, Academia Sinica, Inst. of Inf. Science, Taipei, Taiwan.
2011 Smith Distinguished lecture, Feb 18, UC Irvine, School of Inf and CS, Irvine, CA.
2011 Northrup Grumman Corp (NGC), May 11, invited presentation on Software Safety, El Segundo, CA.
2011 Software Certification Consortium, invited presentation, Nov. 9-10, Toronto, Canada.
2010 Jason Study Group, San Diego, CA, June 2010.
2009 IT Eminent Lecture Series, Louisiana State University, April 24, Baton Rouge, LA.
2009 Aerospace Corporation, July 23, El Segundo, CA.
2008 CWI, Amsterdam, The Netherlands, May 23, 2008.
2007 University of California at Riverside, CA, USA.
2006 Twente University, Netherlands, on the occasion of the doctorate honoris causa.
2004 Distinguished Lecture Series, Stanford University, CS/EE, Palo Alto, CA, USA.
2004 Distinguished Lecture Series, UCLA, CS, Los Angeles, CA, USA.
2004 Microsoft Summerschool, Univ. Washington, USA.
2002 Distinguished lecture series, University of Michigan, USA.
2002 Seminar for Joseph Sifakis, (speakers: Pnueli, Clarke, Cousot, Holzmann), Grenoble, France.
2002 Distinguished lecture series, University of Toronto, Canada.
2002 Distinguished Lecture Series, Telcordia Research, Morristown, NJ, USA.
2002 Distinguished Lecture Series, Columbia University, CS Department, NY, USA.
2002 Distinguished Lecture Series, IBM T.J. Watson Research Center, NY, USA.
2001 Microsoft Research, Seattle, Oregon, USA.
2001 Distinguished lecture series, University of Pennsylvania, USA.
2001 Stevens Institute of Technology, NJ, USA.
2000 Distinguished lecture series, Kansas State University, Kansas, USA.
1999 NASA/Ames Research Center, Moffett Field, Ca., USA.
1998 Distinguished lecture series, University of Virginia, USA.
1998 NASA/JPL, Jet Propulsion Laboratory, Pasadena, Ca., USA.
1997 NASA Verification and Validation Facility, West Virginia, USA.
1997 Telematics Research Center, Enschede, Netherlands.
1997 Formal Methods Day at Royal Holloway, Univ. of Surrey, U.K.
1996 UC Berkeley, Ca., USA.
1995 Software Process Improvement Network Meeting, New Jersey, USA.
1995 University of Utah, USA.
1995 State Univ. of New York, Stony Brook, New York.
1995 Distinguished lecture series, CS, North Carolina State University.
1993 Binghamton University, New York, USA.
1993 ESPRIT/CONCUR Project Review Meeting, Stockholm, Sweden
1992 Telia Research, Sweden
1992 FDTH University, Lausanne, Switzerland.
1992 Bellcore Research, Morristown, New Jersey, USA.
1992 Univ. of Montreal, Canada.
1991 ESPRIT/SPEC Project Review Meeting, Sigtuna, Sweden

1990 University of New Mexico, N.M., USA.

Invited Talks at Conferences

- 2017 Keynote 24th International Spin Symposium, UC Santa Barbara, CA, July 13-14.
- 2017 Invited presentation, ASE Conference, Urbana, Ill, Oct 30-Nov 3.
- 2015 Invited presentation at ICSE2015, Florence, Italy, for the IEEE Harlan Mills award.
- 2014 Invited Lectures, 4th Summer School on Formal Techniques, May 19-24, Menlo College, CA.
- 2014 Keynote 26th IEEE Software Technology Conf., March 31 - April 3, 2014, Long Beach, CA.
- 2013 Keynote Flight Software Workshop, Dec 10-12, Pasadena.
- 2013 Keynote ISSRE, IEEE Int. Symp., on Softw. Reliability Eng., Nov. 4-7, Pasadena.
- 2012 Keynote USENIX Hot Topics in Dependable Systems Workshop, LA, Oct. 7, 2012.
- 2012 Keynote PDMC 2012 (Parallel and Distributed Model Checking),
17 September, Imperial College, London, UK.
- 2012 Workshop on Validation of Autonomous Systems, Caltech, Pasadena, 8/21-8/23, 2012.
- 2012 Workshop on Engineering Resilient space Systems, Keck Institute, Caltech, Pasadena, 7/30-8/3.
- 2012 Formal Verification of multi-threaded code. 2nd Workshop on Automated Verification,
Analysis and Synthesis. Keynote speaker, Taipei, Taiwan, April 10.
- 2011 Reliable Software Development: Analysis-Aware Design. Plenary/unifying speaker,
ETAPS 2011 Conference, Saarbrücken, Germany, March 26 - April 4 2011.
- 2011 Keynote speaker, SSIRI (5th Int. Conf. on Secure Software Integr. and Reliability Impr.),
Jeju Island, S. Korea, June 2011.
- 2011 Keynote speaker, SafeComp 2011, Naples, Italy.
- 2010 Keynote speaker, PSTV/FMOODS/FORTE, 30 year anniversary conference,
Amsterdam, The Netherlands, June 2010.
- 2009 Problems worthy of attack. Plenary speaker,
9th Annual Lee Center Workshop, Caltech, Pasadena, May 22.
- 2009 The performance of Swarm Search methods. Invited speaker,
Symposium on Combinatorial Search, Lake Arrowhead, CA, July 2009.
- 2009 Tool support for code reviews. Invited speaker,
NASA Software Working Group meeting, Sept. 3, 2009.
- 2009 The practice of formal methods. Invited speaker,
Caltech Wkshp Formal Methods for Verification & Validation of Real-Time systems, Sept. 09.
- 2009 Scrub and Spin, stealth use of formal methods in software development. Invited speaker,
OOPSLA '09 (Int. Conf. on Object Oriented Prog.), Orlando, Florida, Oct. 27.
- 2009 Reliable software systems. Keynote speaker,
3rd Workshop on Spacecraft Flight Software, Cahill Center, Caltech, Nov. 2009.
- 2008 On Limits, invited speaker,
6th Langley Formal Methods Workshop, Virginia, 30 April 2008.
- 2008 Keynote, 23rd IEEE/ACM Int. Conf. on Automated Software Engineering (ASE08),
L'Aquila, Italy, Sept. 15-19, 2008.
- 2007 Multi-Core Algorithms for Model Checking with Spin,
5th Int. Workshop on Parallel and Distributed Methods in Verification,
PDMC 2007, Berlin, Germany, July 2007.
- 2006 Developing Safety Critical Software, ICT-Kenniscongress, Amsterdam,
The Netherlands, April 2006.
- 2006 On coding rules for reliable software,
NASA Workshop on Ultra-Reliability,
Marshall Space Flight Center, Huntsville, AL., June 2006.
- 2006 Software architectures for reliable systems,
Space Mission Challenges for Information Technology,
Pasadena, CA, July 2006.
- 2006 The design of a multi-core extension of the Spin Model Checker,

- Formal Methods for Computer Aided Design Conference (FMCAD2006),
San Jose, CA, November 2006.
- 2005 Verification Grand Challenge Workshop,
SRI Int., CA, February 2005.
- 2005 Software Reliability, National Space Society, Washington, USA, May 2005.
- 2005 Theories, Methods, and Tools for Building Systems from Interacting Components,
Caltech, CS, Workshop, October 31, 2005.
- 2004 Formal Methods and Software Reliability,
Formal Methods and Models for CoDesign, IEEE, San Diego, CA, June 2004.
- 2004 Economics of Software Verification, 2004 U. of Washington and Microsoft
Summer Institute on Trends in Testing: Theory, Techniques and Tools.
Portland, Oregon, August 2004.
- 2003 Turing, Strachey and Spin,
10th Spin Workshop, Portland, Oregon, May 2003, keynote.
- 2003 Software Verification and Model Checking
Space Mission Challenges in Information Technology (SMC-IT), Pasadena, CA, July 2003.
- 2003 Trends in Software Verification,
Formal Methods Europe Conference, Italy, September 2003.
- 2002 Analysis of Software
6th World Conference on Integrated Design & Process Technology (IDPT 2002)
Los Angeles, CA, USA, June 2002.
- 2002 Software Analysis and Model Checking,
CAV02, 14th Conf. on Computer Aided Verification,
Copenhagen, Denmark, July 2002.
- 2002 A Survey of Automata Based Testing Techniques
World Computer Congress 2002, Montreal, Canada, August 2002.
- 2002 The Logic of Bugs,
FSE-10, ACM SigSoft 10th Int. Symp. on the Foundations of Software Engineering,
Charleston, SC, USA, November 2002, keynote.
- 2001 From Code to Models,
Second Int. Conference on Application of Concurrency to System Design,
Newcastle upon Tyne, UK, June 2001.
- 2001 Economics of software verification,
PASTE01, Workshop on Program Analysis for Software Tools and Engineering,
Snowbird, Utah, USA, June 2001.
- 2000 Testing Distributed Systems Software,
AST2000, Automated Software Testing Symposium,
Lucent Technologies, Holmdel, New Jersey, Nov. 2000
- 2000 Formal Verification of Call Processing Software,
MFPS2000, 16th Conf. on Mathematical Foundations of Programming Semantics,
Hoboken, New Jersey, USA, April 2000.
(The other invited speakers included Ed Clarke and Allen Emerson.)
- 2000 Proving Properties of C Programs,
First Int. Workshop on Automated Program Analysis, Testing and Verification,
ICSE Workshop, Limerick, Ireland, June 2000
- 2000 Proving Properties of C Programs,
Workshop on Specification and Analysis of Protocols and Reactive Systems,
Verimag, Grenoble, France, June 2000.
(Other invited speakers were Pierre Wolper, Amir Pnueli and Joseph Sifakis.)
- 1999 A practical method for the verification of event-driven software, (with M.H. Smith),
ICSE99, Int. Conf. on Software Engineering, Los Angeles CA USA, May 1999.
- 1999 Software model checking—Extracting verification models from source code, (with M.H. Smith),
FORTE/PSTV99, Formal Methods for Protocol Engineering and Distributed Systems,

- Beijing, China, Oct. 1999.
- 1998 Designing executable abstractions,
FMSP98, Formal Methods in Software Practice,
Clearwater Beach, Florida USA, March 1998. (Keynote presentation.)
- 1998 On Checking Model Checkers,
CAV98, Tenth Conf. on Computer Aided Verification,
Vancouver Canada, June 1998.
(The two other invited speakers were Carl Seger and Pierre Wolper.)
- 1998 The Spin Model Checker,
IFIP Working Group 2.2, Formal Description of Programming Concepts,
Shelter Island, New York, June 1998.
- 1997 On Finding Bugs in Concurrent Programs,
USENIX Annual Technical Conference,
Anaheim, California, USA, January 1997.
- 1997 Design Verification: Bridging the Gap,
IFIP Working Group 2.2, Formal Description of Programming Concepts,
Graz, Austria, Sep 20-24.
- 1996 Formal Methods for Early Fault Detection,
FTRFT96, 3rd Conf. on Formal Techniques for Real-Time and Fault Tolerant Systems,
Uppsala Sweden, Sept. 1996.
(Other invited speakers included Amir Pnueli, and Pamela Zave.)
- 1996 Early Fault Detection Tools,
TACAS96, 2nd Conf. Tools and Algorithms for the Construction and Analysis of Systems,
Passau, Germany, March 1996.
(The two other invited speakers were Leslie Lamport and Dexter Kozen.)
- 1994 Proving the Value of Formal Methods,
IFIP FORTE94, 7th Int. Conf. on Formal Description Techniques,
Berne, Switzerland, Oct. 1994.
(The two other invited speaker were Leslie Lamport and Nancy Lynch.)
- 1994 Data Communications—The First 2500 Years,
WCC94, 13th IFIP World Computer Congress,
Hamburg, Germany, August 1994.
(Another invited speaker in the same session was Konrad Zuse.)
- 1994 The Theory and Practice of a Formal Method: NewCoRe,
WCC94, 13th IFIP World Computer Congress,
Hamburg, Germany, August 1994.
- 1987 On Limits and Possibilities of Automated Protocol Analysis,
IFIP PSTV87, 6th Int. Conf on Protocol Specification Testing and Verification,
Zurich, Switzerland, June 1987.

Publications in Peer Reviewed Journals (chronological)

1. G.J. Holzmann, Coordinatie—een net van betrouwbare processors, *De Ingenieur*, Vol. 93, 43, October 1981, (In Dutch.)
2. G.J. Holzmann, A Theory for Protocol Validation, *IEEE Transactions on Computers*, Vol. C-31, 8, pp. 730-738, August 1982.
3. G.J. Holzmann, Communicatie Protocollen—ontwerp analyse en standaardisatie, *Informatie*, Vol. 25, 1, pp. 5-11, January 1983, (In Dutch.)
4. G.J. Holzmann, Tracing Protocols, *AT&T Technical Journal*, Vol. 64, 10, pp. 2413-2433, December 1985. Also in: *Current advances in distributed computation* Computer Science Press 1986.
5. G.J. Holzmann, Automated protocol validation in Argos assertion proving and scatter searching, *IEEE Trans. on Software Engineering*, Vol. SE-13, 6, pp. 683-696, June 1986.

Also in: Current advances in distributed computation CS Press 1986.

6. G.J. Holzmann, Protocol Tracing, Computer Networks and Simulation, Vol. III, North Holland Publ. Co, 1986.
7. G.J. Holzmann, Pico—a picture editor, AT&T Techn. Journal, Vol. 66, 2, pp. 2-13, April 1987.
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Hitting the News

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Program Committees

AAS97	ACM Workshop on Automated Analysis of Software	'97
ATVA	Automated Technology for Verification and Analysis	'05
AVoCS	Automated Verification of Critical Systems	'05
CAV	Int. Conf. on Computer Aided Verification	'90-05;'15;'17
CONCUR	Int. Conf. on Concurrency Theory	'97
COUFLESS	Int. Wkshp on Faults and Failures in Large Softw. Systems '14-15	
DCCA	IFIP Conf. on Dependable Computing for Critical Applications	'99
FATES	Formal Approaches to Testing of Software	'05
FORTE	IFIP Int. Conf. on Formal Description Techniques	'94-95,05-09,12,15
FM	Formal Methods Conference	'06,15
GC06	Grand Challenge in Verified Software	'05-06
GRAPHITE	Wkshp on Graph Inspection and Traversal Eng.	'12-13
HVC09	Haifa Verification Conference	'09
ICDCS	Int. Conference on Distributed Computing Systems	'95-96,98
ICSE	Int. Conference on Software Engineering	'12
ICST	IEEE Int Conf. on Sw Testing, Verification, and Validation	'10-11
IFIP	Working Conf. on Verified Software: Theories, Tools (Hoare/Misra/Shankar)	'05
IWPTS	IFIP Int. Workshop on Protocol Test Systems	'94
IWTCS	IFIP Int. Workshop on Testing of Communicating Systems	'97-98
MARS	Int. Workshop on Models for Analysis of Real-time Systems '15;'17	
MochART	Int. Workshop on Model Checking and Art. Intelligence	'05,08
NFM	NASA Formal Methods Symposium, PC and Organizing Cmt	'09-17
PDMC	Parallel and Distributed Methods in verifiCation	'08-12
POMIV96	DIMACS Workshop on Partial Order Methods in Verification	'96
PSTV	IFIP Int. Conf. on Protocol Specification, Testing, and Verification	'93-95
PSTV/FORTE	IFIP Joint PSTV/FORTE Conference	'96,00-07
QMSSW	NASA Quality Mission Software & Systems Eng.	'08-10
RV	Int. Workshop on Runtime Verification	'01-15
SAVCBS	Spec. and Verification of Component Based Systems	'05
SDL-Forum	Int. Conf. on the SDL Formal Description Language	'99
SMC	Int. Workshop on Software Model Checking (post-CAV)	'01,03
SPIN	Int. Workshop on the SPIN Verification System	'95-17
SVW00	Int. Workshop on Software Verification (post-ICSE00)	'00
TACAS	Int. Conf. on Tools and Alg's for the Constr'n. and Analysis of Systems	'97,99-00,13-14
TestCom	'06-07	
VMCAI	Int. Conf on Verification, Model Checking and Abstract Interpretation	'04

VSR Verified Software Repository Initiative
VVPS Verification and Validation of Planning and Scheduling Systems

'05-06
'05,'09,'11

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