



Curriculum Vitae Professor Dr Gernot Heiser



Image: CSE

Name: Gernot Heiser

Research Priorities: Computer science, operating systems, computer software, microkernels, covert channels, cyber security

Gernot Heiser is a German-Australian computer scientist. His research focus is on operating systems, especially microkernel-based systems and their application in embedded/cyber-physical systems. He is a pioneer of the use of mathematical proof techniques for ensuring the security and dependability of software systems. His innovations are used to ensure the security of medical devices, airplanes, critical infrastructure, and national security systems.

Academic and Professional Career

- since 2021 Leader, Trustworthy Systems Group, University of New South Wales (UNSW), Sydney, Australia
- 2018 - 2022 Chief Scientist (Software), HENSOLDT Cyber GmbH, Taufkirchen, Germany
- 2016 - 2021 Chief Research Scientist, CSIRO's Data61, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Canberra, Australia
- since 2009 John Lions Chair in Operating Systems, UNSW, Sydney, Australia
- 2007 - 2010 Founder and Chief Technology Officer, Open Kernel Labs, Sydney, Australia
- 2002 - 2015 Leader, Operating Systems Research Group, National ICT Australia (NICTA), Sydney, Australia
- since 2002 Professor, UNSW, Sydney, Australia
- 2001 - 2002 Visiting Professor, Karlsruhe Institute for Technology (KIT), Karlsruhe, Germany
- 1998 - 2002 Associate Professor, UNSW, Sydney, Australia
- 1997 - 2003 Leader, Computer Systems Engineering Group, UNSW, Sydney, Australia

- 1991 - 1998 Lecturer / Senior Lecturer, UNSW, Sydney, Australia
- 1991 PhD in Computer Engineering, Eidgenössische Technische Hochschule (ETH) Zürich, Zurich, Switzerland
- 1985 - 1987 Teaching and Research Assistant, Computer Science Department, ETH Zürich, Zurich, Switzerland
- 1984 MSc in Physics, Brock University, St. Catharines, Canada
- 1982 - 1984 Teaching Assistant, Department of Physics, Brock University, St. Catharines, Canada
- 1981 BSc in Physics, Albert-Ludwigs-University Freiburg, Germany

Functions in Scientific Societies and Committees

- since 2021 Member, Advisory Panel, Australian Privacy Foundation, Sydney, Australia
- since 2021 Member, Scientific Advisory Board, Secure Systems Research Center (SSRC), Technology Innovation Institute (TII), Abu Dhabi, United Arab Emirates
- since 2021 Chief Scientific Officer, Neutrality, Switzerland
- since 2020 Founding Chairman, the seL4 Foundation, Wilmington, USA
- since 2018 Member, Scientific Advisory Board, Max-Planck-Institute for Software Systems, Saarbrücken, Germany
- 2017 - 2019 Associate Editor, Transactions on Computers
- since 2013 Co-Editor, Leibniz Transactions on Embedded Systems (LITES)
- 2013 - 2015 Member, Steering Committee, Special Interest Group on Operating Systems (SIGPLAN/SIGOPS), Conference on Virtual Execution Environments (VEE), Association for Computing Machinery (ACM), New York City, USA
- 2012 - 2014 Chair, Steering Committee, Asia-Pacific Workshop on Systems (APSys)
- 2011 - 2014 Member, Steering Committee, ACM EuroSys
- 2010 - 2014 Member, Steering Committee, APSys
- since 2010 Member, Steering Committee, Pacific-Rim International Symposium on Dependable Computing (PRDC)

Honours and Awarded Memberships

- 2023 Software System Award, Association for Computing Machinery, ACM, New York City, USA
- since 2022 Member, German National Academy of Sciences Leopoldina, Germany

- since 2022 Fellow, Royal Society of New South Wales (RSN), Crows Nest, Australia
- 2019 Hall of Fame Award, Association for Computing Machinery's Special Interest Group on Operating Systems, SIGOPS, ACM, New York City, USA
- since 2016 Fellow, Australian Academy of Technology and Engineering (ATSE), Canberra, Australia
- since 2016 Fellow, Institute of Electrical and Electronics Engineers (IEEE), New York City, USA
- 2016 Information and Communications Technology (ICT) Researcher of the Year, South East Asia Regional Computer Confederation (SEARCC)
- 2015 ICT Researcher of the Year, Australian Computer Society Digital Disruptor Award, Australian Computer Society (ACS), Australia
- since 2014 Fellow, ACM, New York City, USA
- 2014 - 2015 Placement, Top 100 Most influential engineers of Australia
- 2012 Award for Teaching Excellence, UNSW, Sydney, Australia
- 2011 Placement, Top 100 Most influential engineers of Australia
- since 2011 Scientia Professor, UNSW, Sydney, Australia
- 2010 A. Richard Newton Excellence in Research Impact Award (with Team), National Information and Communications Technology Australia Limited (NICTA), Sidney, Australia
- 2010 Innovation Hero Award, Warren Centre, Sydney, Australia
- 2009 Scientist of the Year in New South Wales, Category "Engineering, Mathematics and Computer Science", Government of New South Wales, Australia
- 2008 A. Richard Newton Excellence in Research Impact Award, NICTA, Sidney Australia

Research Priorities

Gernot Heiser is a German-Australian computer scientist. His research focus is on operating systems, especially microkernel-based systems and their application in embedded/cyber-physical systems. He is a pioneer of the use of mathematical proof techniques for ensuring the security and dependability of software systems. His innovations are used to ensure the security of medical devices, airplanes, critical infrastructure, and national security systems.

Gernot Heiser works on operating system security and more generally fundamental solutions to cyber-security threats. His focus is on improving the security and reliability of operating systems through the use of microkernel technology and formal verification. His team developed the seL4 microkernel, the first general-purpose operating system kernel with a proof of implementation correctness, considered a milestone in the application of formal methods to real-world software.

Besides continuing to improve seL4, focuses on the development of practical high-assurance systems based on seL4.

A related area of interest are microarchitectural timing channels and their prevention. He demonstrated the first practical, cross-core attack on encryption keys through a shared cache. He subsequently developed a set of mechanisms, collectively called “time protection”, for the systematic prevention of information leakage through timing channels. Further research areas are energy/power management, virtualisation, and architectural support for operating systems.

His research outcomes are widely deployed. His earlier L4 microkernel shipped on billions of mobile communication chips and on the security processor of all iOS devices. seL4 was shown to be effective in protecting autonomous vehicles from cyber attacks, and is being designed into practical defence systems, critical infrastructure, autonomous cars and IoT devices.