

Gerhard Kramer

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Gerhard Kramer is Professor of Communications Engineering at the Technical University of Munich (TUM). Since 2019, he has been TUM Senior Vice President for Research and Innovation and responsible for the Office for Research and Innovation (ForTe), which supports national and international research projects, commercial co-operations, patents, licensing, technology-based start-ups, and a talent factory for postdocs. His responsibilities include chairing numerous university boards, such as the Appointment and Tenure Board. Past responsibilities include launching the TUM Innovation Networks, Sustainable Futures Strategy, and Venture Labs.

Kramer received the B.Sc. and M.Sc. degrees in electrical engineering from the University of Manitoba in 1991 and 1992, respectively, and the Dr. sc. techn. degree from ETH Zurich in 1998. From 1998 to 2000, he was with Endora Tech AG in Basel, Switzerland. From 2000 to 2008, he was with the Math Center at Bell Labs in Murray Hill, NJ. He joined the University of Southern California (USC), Los Angeles, CA, as a Professor of Electrical Engineering in 2009. He joined TUM as an Alexander von Humboldt Professor in 2010.

His research interests are information theory, communications theory, and coding. He has made several contributions to communications research. His doctoral thesis introduced causally conditioned directed information, which characterizes information flow and causal influence in communication networks. The thesis was awarded an ETH medal. During his postgraduate studies, he also worked on linear cryptanalysis of block ciphers and code time division multiple access (CTDMA).

At Bell Labs, Kramer worked primarily on information theory for multi-terminal communications, including relay, interference, broadcast, and multi-access channels. Among other results, in source coding, he introduced empirical coordination via communicating probability distributions and quantization-based relaying for distributed multi-input multi-output (MIMO) wireless networks. In channel coding, he developed the theory of extrinsic information transfer (EXIT) charts, including establishing their area property and showing how to design near-optimal codes for MIMO channels. He developed information theory for optical fiber networks and channel estimation algorithms for digital subscriber lines (DSL). He received the Stephen O. Rice Prize Paper Award of the IEEE Communications Society for his work on coded modulation for MIMO, the Vodafone Innovations Prize for his work on relaying, and a Paper Award from the European Association for Signal Processing (EURASIP) for work on wiretap channels. He was listed as a Thomson Reuters Highly Cited Researcher for high-impact work in computer science in 2014-2016.

At Bell Labs, he played key roles in initiating two applied projects: Lucent's transition to higher-order modulation for long-haul fiber-optic links and Alcatel-Lucent's transition to vectoring for DSL. He was a member of two teams recognized by Bell Labs teamwork awards: a long-haul optical fiber team and a high-capacity wireless team. He received a Thomas Alva Edison Patent Award from the Research & Development Council of New Jersey for an invention that improves DSL channel estimation. He has 20 issued patents.

At TUM, he has supported over 60 doctoral researchers and postdocs on topics in communications engineering, including wireless (low-latency codes, coded modulation, quantized precoding, sensing), optical (capacity, constellation shaping, phase noise), and basic theory (compression, feedback, secrecy, stealth). He likes to work on information theory fundamentals and is proud of his research staff's impact on communications practice. He received a 2015 Lecturer Award from the student association of the TUM ECE Department for teaching digital communications.

Kramer is an IEEE Fellow. He has been active in the IEEE Information Theory Society (ITSoc), including as publications editor in 2004-2005 and associate editor for Shannon theory in 2006-2008. In 2008, he co-founded the Schools of Information Theory, which grew to annual events in Australia, East Asia, Europe, India, and North America. The IEEE Educational Activities Board recognized the ITSoc school program through its Society/Council Professional Development Award in 2014. Kramer was elected to the ITSoc board of governors in 2009 and became president in 2013. He has chaired several of the society's flagship events, including ISITs in Toronto (2008 TPC Chair), Honolulu (2014 TPC Chair), Aachen (2017 General Chair), and Taipei (2023 General Chair), and ITW in Kaohsiung (2017 General Chair). He received the ITSoc Aaron D. Wyner Distinguished Service Award in 2021 for outstanding leadership in, and providing long-standing, exceptional service to, the information theory community.

Kramer is a member of the Bavarian Academy of Sciences and Humanities (BAdW) and the BAdW Technology Forum. Since 2013, he has served as a member of the board of curators of the Eduard Rhein Foundation, a non-profit foundation that presents monetary awards for achievements in radio, television, and information technology that promote public welfare. Since 2020, he has been a member of the board of curators of the Max Planck Institute of Quantum Optics and the IMT Science Council. Since 2022, he has been a member of the supervisory boards of TUM CREATE Ltd., the Munich Quantum Valley e.V., and the TUM Venture Labs Management gGmbH.