

RESUME

NAME/ADDRESS: KOFI KORSAH

EDUCATION: **B.S. (Electrical Engineering)**, University of Science & Technology, Kumasi, Ghana, 1973
M.S. (Nuclear Engineering), University of Missouri, Columbia, Missouri, 1980
Ph.D. (Nuclear Engineering), University of Missouri, Columbia, Missouri, 1983

PRESENT EMPLOYMENT: Oak Ridge National Laboratory (since 1990). Dr. Korsah has been the lead or co-principal investigator for several Nuclear Regulatory Commission sponsored research on the potential safety implications, qualification and cyber security issues associated with the application of digital and advanced technologies in nuclear power plants. He was also a team member for a Space Reactor Instrumentation and Controls (Prometheus) project, in which his work included temperature measurement design concepts, I&C systems architecture, and systems integration approaches for the instrumentation requirements for a space reactor concept. He is currently the project manager for *Emerging Nuclear I&C Technologies*, an NRC-sponsored project that seeks to assist the NRC in the identification of key research areas on emerging technologies within the instrumentation and controls field that may become important in the future. He also manages an Air Force-sponsored project that is characterizing several models of hydrazine monitors in the U.S. Air Force inventory.

INTERESTS: Sensors and measurement systems for nuclear and homeland security applications; Standards development for the nuclear industry; Data acquisition systems and systems integration; Metrology research; Novel nanotechnology-based sensors.

PATENTS/AWARDS: **U.S. Patent Pending**, “Doped Carbon Nanostructure Field Emitter Arrays for Infrared Imaging.”
U.S. Patent No. 6,044,332; “Surface Acoustic Wave Harmonic Analysis.”
Nominee for Significant Event Award, Oak Ridge National Laboratory, 2003.
Best Author Award, 1994 Joint POWID/EPRI Conf., Orlando, FL.; **Session: Safety System Upgrades for Nuclear Plants**.
Best Paper Award, Nuclear Radiation Physics Category, American Nuclear Soc. 18th Annual Midwest Student Conf., Iowa State University, 1981.

PROFESSIONAL

CONTRIBUTIONS: **Member (elected office); IEEE Standards Committee on Qualification (SC2)**. SC2 has jurisdiction over several Working Groups that develop various standards related to qualification of equipment for nuclear safety applications.
Vice Chair, IEEE Standards Development Working Group (SC2.15) for the development of a new standard for qualification of optical fibers for use in nuclear power plants.
Working Group member for the development of IEEE-7-4.3.2-1993, *Standard Criteria for Digital Computers in Safety Systems of Nuclear Power Generating Stations*.

PUBLICATIONS:

M. K. Howlader, K. Korsah, P. D. Ewing, “Technical Basis for Regulatory Guidance on Implementing Wireless Communications in Nuclear Facilities,” ORNL/TM-2007/210, U.S. Nuclear Regulatory Commission, November 2007.

K. Korsah, R. A. Kisner, R. T. Wood, “Procedure for the Review of Safety-Critical Display and Control Systems,” ORNL/NRC/LTR, U.S. Nuclear Regulatory Commission, October 2007, in review.

R. Kisner, D. Holcomb, J. Mullens, T. Wilson, R. Wood, K. Korsah, M. Muhlheim, A. Qualls, M. Howlader, G. Wetherington, Jr., P. Chiaro, Jr., and A. Loebel, “Technical Review Guidance and Acceptance for Digital Communications in Highly Integrated Control Rooms,” NUREG/CR, U.S. Nuclear Regulatory Commission, September 2007, in review.

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R. Kisner, J. Mullens, T. Wilson, R. Wood, K. Korsah, A. Qualls, M. Muhlheim, D. Holcomb, and A. Loebl, "Safety and Nonsafety Communications and Interactions in International," ORNL/NRC/LTR-07/05, U.S. Nuclear Regulatory Commission, June 2007.

William Murray, Kofi Korsah, Bruce Tomkins and Vilmos Kertesz, "Effects of Relative Humidity and Carbon Dioxide Concentration on Electrochemical Hydrazine Monitors in the United States Air Force Inventory," to be published in the *Journal of Occupational and Environmental Hygiene*.

John Caughman, Larry Baylor, Roger Kisner and Kofi Korsah, "Properties of carbon-based nanostructures grown by low-pressure plasma enhanced chemical vapor deposition," Proceedings of the American Vacuum Society, CA, 2006.

Kofi Korsah, R.T. Wood, Eva Freer, and Christina Antonescu, "Emerging Sensor and I&C Technologies for Nuclear Power Plants," Proceedings of the 5th Nuclear Power Plant Instrumentation and Control, and Human-Machine Interface Technologies, NM, 2006.

Roger Kisner, John Wilgen, P.D. Ewing, and Kofi Korsah, "Regulatory Guidance for Lightning Protection in Nuclear Power Plants," Proceedings of the 5th Nuclear Power Plant Instrumentation and Control, and Human-Machine Interface Technologies, NM, 2006.

Brian Kaldenbach, P.D. Ewing, Michael Moore, and Kofi Korsah, "Safety-Related Issues Associated with Implementing Wireless Systems in Nuclear Power Plants," Proceedings of the 5th Nuclear Power Plant Instrumentation and Control, and Human-Machine Interface Technologies, NM, 2006.

R.T. Wood and K. Korsah, "Licensing Requirements for Safety-Related Digital Instrumentation and Control Systems at Nuclear Power Plants in the United States," presented at the IAEA Technical Meeting on Implementing and Licensing Digital I&C Systems and Equipment in Nuclear Power Plants, Espoo, Finland, November 22-24, 2005.

William Bryan, Michael Muhlheim, Tom Wilson, Richard Wood, David Holcomb, Kofi Korsah, Usha Jagadish, *Jupiter Icy Moons Orbiter Mission Reactor Instrumentation And Controls Architecture Alternatives Study*, ORNL/LTR/NR-PTOM1/05-06, October 2005.

Roger A. Kisner, Michael J. Lance, Evan K. Ohriner, Theodore J. Huxford, Louis K. Mansur, Kofi Korsah, David E. Holcomb, Hua-Tay Lin, *Resistance Temperature Detector Conceptual Design for Space Nuclear Power Systems*, ORNL/LTR/NR-PROM1/05-11, June 2005.

M. S. Emery, K. Korsah, M. J. Lance, M. L. Simpson, L. K. Mansur, H. T. Lin, D. E. Holcomb, B. R. D'Urso, R. A. Kisner, *Sensor Cable Conceptual Design*, ORNL/LTR/NR-PROM1/05-20, August 2005.

Richard T. Wood, Kofi Korsah, Michael D. Muhlheim, and John K. Munro, *Overview of Regulations, Requirements, and Guidelines for Civilian Nuclear Reactors*, ORNL/LTR/NR-PROM1/05-13, June 2005.

Roger A. Kisner, Kofi Korsah, Michael S. Hileman, James E. Hardy, David E. Holcomb, Charles L. Britton, Jr., *Thermocouple Conceptual Design for Space Nuclear Power Systems*, ORNL/LTR/NR-PROM1/05-05, October 2005.

Kofi Korsah, William Murray, and Bruce Tomkins, "Hydrazine Scene: It's a Gas," *InTech*, Vol. 52, No. 10, pp48-50, October 2005.

Kofi Korsah, Randall Wetherington, Richard Wood, L. F. Miller, Ke Zhao, Avijit Paul, *Emerging Technologies in Instrumentation and Controls – An Update*, NUREG/CR-6888, January 2006.

P. D. Ewing, R. A. Kisner, K. Korsah, M.R. Moore, J.B. Wilgen and R. T. Wood, *Technical Basis for Regulatory Guidance on Lightning Protection in Nuclear Power Plants*, NUREG/CR-6866, January 2006.

Kofi Korsah, Bill Murray, and Bruce Tomkins, "An Improved Methodology for Calibrating Hydrazine Monitors," Proc. 51st International Instrumentation Symposium (IIS), May 2005.

B. J. Kaldenbach, M. R. Moore, P. D. Ewing, W. W. Manges, C. L. Dillard, K. Korsah, R. A. Kisner, *Assessment of Wireless Technologies and Their Application at Nuclear Power Plants*, NUREG/CR-6882, July 2005.

R. T. Wood, S.A. Arndt, J.R. Easter, K. Korsah, J.S. Neal, E.L. Quinn, and G.W. Remley, "Advanced Reactor Licensing: Experience with Digital I&C Technology in Evolutionary Plants," NUREG/CR-6842, April 2004.

Kofi Korsah, Roger Kisner, Lynn Boatner, Hans Christen, Deidre Paris, "Preliminary Investigation of KTN as a Surface Acoustic Wave Infrared/Thermal Detector," *Sensors and Actuators, A: Physical*, Vol. 119, No. 2, p 358-364, April 2005.

K. Korsah, Richard T. Wood, Saliman Isa, Christina Antonescu, "Qualification of Microprocessor-Based Commercial-off-the-Shelf (COTS) Equipment for Nuclear Power Plant Safety System Applications," Proceedings of the 4th International Topical Meeting on Nuclear Plant Instrumentation, Control, and Man/Machine Interface (NPIC & HMIT 2004), September 19-22, 2004.

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Randal Wetherington and Kofi Korsah, "A Study of Safety System Isolation from Cyber Attacks," NUREG/CR (Classified Document), Nuclear Regulatory Commission, May 2004.

Kofi Korsah et. et., "Qualification of Microprocessor-based Commercial-off-the-Shelf (COTS) Equipment for Nuclear Power Plant Safety System Applications," *American Nuclear Society 4th International Topical Meeting on Nuclear Plant Instrumentation, Control and Human-Machine Interface Technologies*, 2004, p. 67-72.

Kofi Korsah, Bill Murray and Bruce Tomkins, "An Improved Method For Calibrating Hydrazine Monitors In The United States Air Force Inventory," *Proceedings of the 2003 National Conference of Standards Laboratories (NCSLI)*.

T. J. Tanaka, S. P. Nowlen, Kofi Korsah, R.T. Wood, and C. E. Antonescu, "Impact of Smoke Exposure on Digital Instrumentation and Control," *Nuclear Technology*, Vol. 143, No.2, August 2003. (**Invited paper**).

K. Korsah, et. al., "Emerging Technologies in Instrumentation and Controls," NUREG/CR-6812, March 2003.

Christina Antonescu, Kofi Korsah, Richard Wood, "Qualification of Microprocessor-Based Equipment for Nuclear Power Plant Environments," ISOFIC, 2002.

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K. Korsah and R.T. Wood, "Application of Microprocessor-Based Equipment in Nuclear Power Plants-Technical Basis for a Qualification Methodology," NUREG/CR- 6741, ORNL/TM-2000/236, August 2001

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Korsah, Kofi, Tina J. Tanaka, Christina Antonescu, and Richard Wood, "Technical Basis for Environmental Qualification of Computer-Based Safety Systems in Nuclear Power Plants," *Proc. Intl. Mtg. On Advanced Reactor Safety*, (ARS'97), Orlando, FL, June 1-5, 1997, Vol. 2, pp 754-758. (**Invited Paper**).

Kercel, Steven W., and Kofi Korsah, "Susceptibility of Digital Instrumentation and Control Systems To Disruption by Electromagnetic Interference," *Proc. Intl. Mtg. On Advanced Reactor Safety*, (ARS'97), Orlando, FL, June 1-5, 1997, Vol. 2, pp 772-778.

Korsah, Kofi, Tina Tanaka, Thomas L. Wilson , Jr., and Richard T. Wood, "Environmental Tests of a Digital Safety Channel: An Investigation of Stress-Related Vulnerabilities of Computer-Based Safety Systems," *Nuclear Safety*, Vol 38, No. 1, January-March 1997.

Korsah, Kofi, Tina Tanaka, Thomas L. Wilson , Jr., and Richard T. Wood, *Environmental Testing of an Experimental Digital Safety Channel*, NUREG/CR-6406, Nuclear Regulatory Commission, September 1996.

Korsah, Kofi, Tina Tanaka, Mahbubul Hassan, and Richard Wood, *Technical Basis for Environmental Qualification of Microprocessor-Based Safety-Related Equipment in Nuclear Power Plants*, NUREG/CR-6479, August, 1996.

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Korsah, K., R. L. Clark, and D. E. Holcomb, "A Methodology for Evaluating 'New' Technologies in Nuclear Power Plants," *Instrumentation, Controls, and Automation in the Power Industry, Vol. 37, p. 131-148*, Proceedings of the 4th Annual ISA/EPRI Joint Controls and Automation Conference, Orlando, FL, June 1994.

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Korsah, Kofi, and Christina Antonescu, "Qualification Issues Associated with the Use of Advanced Instrumentation and Control Hardware in Nuclear power Plants," *IAEA Specialists meeting on Experience in Aging, Maintenance and Modernization of Instrumentation and Control Systems for Improving Nuclear Power Plant availability*, Rockville, MD, 1993.

Korsah, Kofi, Robert L. Clark, and Christina Antonescu, "Qualification Issues for Advanced Light-Water Reactor Protection Systems," *American Nuclear Society Topical Meeting*, Oak Ridge, TN, 1993.

Korsah, Kofi and Christina Antonescu, "A Survey of Issues Associated With Microprocessor-Based Reactor Protection Systems Hardware," *Second International Conference on Nuclear Engineering (ICONE-2)*, March 21-24, 1993.

Ewing, Paul, Kofi Korsah, and C. Antonescu, "Immunizing Digital Systems Against Electromagnetic Interference," *Second International Conference on Nuclear Engineering (ICONE-2)*, March 21-24, 1993.

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Korsah, Kofi, and R. T. Wood, *Proposed Use of Digital Technology for Advanced Light Water Reactor Designs*, ORNL/NRC/LTR-91/22, Oak Ridge National Laboratory, September 1991.

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