Center of Excellence in Intelligent Engineering Systems

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CENTER OF EXCELLENCE IN INTELLIGENT ENGINEERING SYSTEMS

Speaker: Prof. Ali Muhammad Ali Rushdi
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Ali Muhammad Ali Rushdi received the B.Sc. degree (Honors) in Electrical Engineering (Electronics and Communications) from Cairo University, in 1974, and the M.S. and Ph.D. degrees in Electrical Engineering from the University of Illinois at Urbana- Champaign, USA in 1977 and 1980, respectively. He maintained a perfect GPA of 5.0/5.0 throughout his study. In 1974 he was appointed Demonstrator and Instructor in the Department of Electronics and Electrical Communications Engineering of Cairo University. From 1976 to 1980 he was Research Assistant in the Electrical Engineering Department of the University of Illinois at Urbana-Champaign. Since 1980 he has been with King Abdulaziz University, where he is now Professor of Electrical and Computer Engineering as well as Head and Coordinator of the Computer Engineering Group. At KAU, he has structured and taught a variety of graduate and undergraduate courses, supervised master and PhD theses and senior projects, and contributed significantly to accreditation activities. He served as a member of the Editorial Board of the IEEE Transactions on Instrumentation and Measurements (1986-1994), and was a frequent reviewer for the IEEE Transactions on Reliability (1983-1998). He is currently a member of the Editorial Board of the Journal of King Abdulaziz University: Engineering Sciences, and is an Associate Editor of Reliability and Computer Engineering for the International Magazine on Advances in Computer Science and Telecommunications (IMACST). His Research Interests and publications over the past four decades spanned the areas of Electromagnetic Communications Engineering, Computer Engineering, Reliability Engineering, Digital Design, Engineering Education, Neural and Switching Networks, Advanced Mathematics, Boolean Algebra and Logic, Engineering Design, Inferential Thinking, and Problem Solving. Prof. Rushdi is an initiated member of the Honorary Societies: Eta Kappa Nu and Phi kappa Phi. He is a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE).

Date: **Monday, December 7, 2015**
Time: **1:00 PM**
Venue: **Engineering Building, Second floor, Room 24C28 (ECE Seminar Room)**

Title

Survival Reliability: An Exposition of System Reliability Analysis with an Ecological Perspective

Abstract

This talk attempts to set the stage for a prospective interplay between ecology and reliability theory concerning the common issues of network connectivity and redundancy. The talk treats the problem of *survival reliability* which is the probability of successful migration of a specific species from a critical habitat patch to destination habitat patches via heterogeneous imperfect corridors. The talk surveys techniques of system reliability in an ecological setting and contributes methods for computing a new measure of reliability that arises when paths to destination habitat patches share common corridors. Care is taken to ensure that the reliability expressions obtained are as compact as possible and to check them for correctness. The talk presents a tutorial exposition of modern reliability techniques, which formulate a problem in the Boolean domain, manipulate formulas to achieve disjointness of logically added subexpressions and retain statistical independence of logically multiplied ones, and finally reach a probability-ready expression that is directly transformed back to the probability domain. Several metrics are covered including system unreliability, life expectancy (MTTF), and component importance measures. We will also consider the issue of numerical computation of the unreliability of ultra-reliable systems, wherein a great loss of significance occurs due to round-off errors which might culminate into some sort of catastrophic cancellation, i.e., a devastating loss of precision inflicted when a small number is computed.

ALL ARE CORDIALLY INVITED