

Biologically-inspired and Nano-scale Communication and Networking

Webcast Type:

Tutorial

[2011 IEEE Global Communications Conference](#)**Webcast URL:**

javascript:openWin('https://dl.comsoc.org/comsocdl/DRM-authentication.action?path=LoginUser&tutorialid=918412','500','700','Shopping Cart')

Status:

Free for Members

Duration:

173minutes

Presentation Date:

Mon, 12/05/2011

Free to Members Date:

Wed, 12/05/2012

Abstract:

The developments in communication technologies have yielded many existing and envisioned information network architectures such as cognitive radio networks, sensor and actor networks, quantum communication networks, terrestrial next generation Internet, and InterPlaNetary Internet. However, there exist many common significant challenges to be addressed for the practical realization of these current and envisioned networking paradigms such as the increased complexity with large scale networks, their dynamic nature, resource constraints, heterogeneous architectures, absence or impracticality of centralized control and infrastructure, need for survivability, and unattended resolution of potential failures. These challenges have been successfully dealt with by Nature, which, as a result of millions of years of evolution, have yielded many biological systems and processes with intrinsic appealing characteristics such as adaptivity to varying environmental conditions, inherent resiliency to failures and damages, successful and collaborative operation on the basis of a limited set of rules and with global intelligence which is larger than superposition of individuals, self-organization, survivability, and evolvability. Inspired by these characteristics, many researchers are currently engaged in developing innovative design paradigms to address the networking challenges of existing and envisioned information systems. In this tutorial, the current state-of-the-art in bio-inspired networking is captured. The existing bio-inspired networking and communication protocols and algorithms devised by looking at biology as a source of inspiration, and by mimicking the laws and dynamics governing these

systems is presented along with open research issues for the bio-inspired networking. Furthermore, the domain of bio-inspired networking is linked to the forthcoming research domain of nanonetworks, which bring a set of unique challenges. The objective of this tutorial is to provide better understanding of the potentials for bio-inspired and nano-scale networking, and to motivate research community to further explore this timely and exciting field.

Bio:

Ozgur B. Akan received the BS and MS degrees in electrical and electronics engineering from Bilkent University and Middle East Technical University, Ankara, Turkey, in June 1999 and January 2002, respectively. He received the PhD degree in electrical and computer engineering from the Broadband and Wireless Networking Laboratory, School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, in May 2004. He is currently Associate Professor with the Department of Electrical and Electronics Engineering, Koc University and the Director of Next-generation and Wireless Communications Laboratory (NWCL). His current research interests are in nanoscale and molecular communications, next-generation wireless networks, biologically-inspired communications, information theory.

Dr. Akan is an Associate Editor for IEEE Transactions on Vehicular Technology, International Journal of Communication Systems (Wiley), Nano Communication Networks Journal (Elsevier), European Transactions on Telecommunications. He served as an Editor for ACM/Springer Wireless Networks (WINET) Journal (2004-2010), as an Area Editor for AD HOC Networks Journal (Elsevier) (2004-2008), as a Guest Editor for several special issues, as the TPC Co-Chair for the IEEE ISCC 2012, ACM MSWiM 2010, the General Co-Chair for The Third International Conference on Bio-Inspired Models of Network, Information, and Computing Systems (ICST/IEEE BIONETICS 2008), the European Vice Chair for The Second International Conference on Nano- Networks (ICST/ACM Nano-Net 2007), an International Vice Chair for IEEE INFOCOM 2006, and in organizing committees and technical program committees of many other international conferences.

He is an IEEE Communications Society Distinguished Lecturer (2011-2012), IEEE Senior Member (Communications Society, Information Theory Society, Vehicular Technology Society), and a member of ACM. He is the Vice President for IEEE Communications Society - Turkey Section. Dr. Akan received the IEEE Communications Society Outstanding Young Researcher Award 2010 for EMEA Region (as runner-up), the IBM Faculty Award twice in 2010 and 2008, Turkish Academy of Sciences Distinguished Young Scientist Award 2008 (TUBA-GEBIP), the 2006 Parlar Foundation Research Encouragement Award for his research in bio-inspired communication techniques for wireless communication networks, the 2006 Editor of the Year Award from AD HOC Networks (Elsevier) Journal, the Best Paper Award in IEEE ISCN 2006, the TUBITAK-Career Award in 2005, and the 2003 Researcher of the Year Award in Broadband and Wireless Networking Laboratory, School of Electrical and Computer Engineering, Georgia Institute of Technology.

Authors:

Akan, Ozgur B.

Source URL: <http://www.comsoc.org/webcasts/view/biologically-inspired-and-nano-scale-communication-and-networking-0>